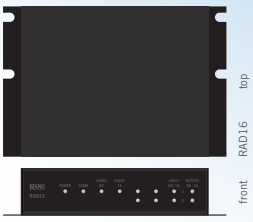
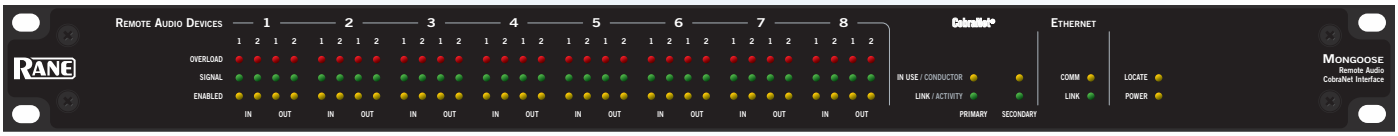
MONGOOSE
Design Manual





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SECTION 1: INTRODUCTION

Perhaps you are familiar with the furry yet ferocious mongoose, a member of the Herpestidae family that is known for its agility and cunning – so fast and smart that it can capture venomous snakes, even king cobras. But did you know that a Rane Mongoose can perform a similar feat with your CobraNet network? Now we're certainly not insinuating that CobraNet is venomous! In fact, we'd say just the opposite. CobraNet is an excellent technology for distributing digital audio. But its 8-channel Bundle architecture can be difficult to utilize and tame, especially if you have only a few channels to distribute from within a given space. If this describes your situation, you've come to the right place.

The Rane Mongoose system, designed to wrestle and control your CobraNet Bundles and other analog cables, distributes digital audio signals over shielded CAT 5e cable between low channel count locations and the rest of your audio system. To accomplish this, it utilizes a network of up to eight Remote Audio Devices (or RADs) that are connected via CAT 5 cable to a single Mongoose host. A RAD, designed to mount inside a standard US two or four gang switchbox, uses high value, professional quality technology to transmit and receive up to four channels of digital audio – two channels in each direction. The Mongoose to which these RADs are connected, serves as the host that controls and aggregates the channels and connects them to the rest of the audio system.

Purpose of this Document

If you design audio systems and are planning to incorporate a Mongoose/RAD network into your next design, then this design manual is for you. It is intended to help you through the design process by giving you background information on the Mongoose system as well as the basic details of how CobraNet works (in case you are unfamiliar with this digital networking technology). This manual details the benefits of using a RAD network and illustrates how to effectively utilize these benefits in various audio applications. It also includes suggested best practices, sample drawings and Mongoose configurations, and key information you should provide to your installers.

PLEASE READ THIS: If you're short on time and are tempted to jump right in without reading this manual, we recommend that you at least skim "SECTION 3: DESIGNING YOUR SYSTEM" on page 25 and, most importantly, read about configuration files in "SECTION 5: INSTALLING AND USING THE MONGOOSE TRACKER" on page 54. However, unless you need to get this design out the door in the next hour, we strongly recommend that you review the entire manual. It contains valuable information that will help ensure a smooth design and installation process.

Rane Mongoose Documentation Set

In addition to this design manual, the Rane documentation set includes an installation manual and a software help system built into the Mongoose Tracker.

The *Mongoose Installation Manual* (available on the Rane website) explains the details of racking the Mongoose and connecting it to the network, installing the RAD devices and connecting them to the Mongoose, and troubleshooting any connection or audio problems that arise.

The software help system, embedded in the Mongoose Tracker software application, contains tutorial simulations to introduce you to the software, information on Mongoose and RAD configuration, detailed information about the user interface as well as detailed procedures for accomplishing specific tasks.

We also recommend you periodically check www.rane.com/mongoose at the Rane website for the latest information on the system (for example, software updates, the release of new RAD models, line art, etc.).

System Requirements

To include a Mongoose/RAD network in an audio system, the system must meet the following requirements: If you plan to use CobraNet to communicate between a Mongoose and other audio devices, those devices must be CobraNet-enabled.

- You must have access to a computer running Microsoft Windows® XP (Service Pack 2 or higher) or any version of Vista or Windows 7 (including 64-bit). The computer must also have an Ethernet port, which you use to connect the computer to the Mongoose (either directly or via an Ethernet network). This connection is necessary for using the Mongoose Tracker software to load configuration information into the device and also for monitoring detailed status information. Note that some status information is visible on the hardware itself.
- You must have administrative rights to install (or upgrade) the Mongoose Tracker software, but you do not need administrative rights to run the software. Note that you also need administrative rights to manually start or stop the RaneLink service (a Windows service installed with Mongoose Tracker that runs at system boot up to ensure the establishment of communications between Mongoose Tracker and the Mongoose). Manual control of this service is rarely needed.
- Most RADs require two, three, or four-gang standard switchboxes (for installation into a wall). The switchbox must have a minimum depth of 2¼" (57 mm).

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SECTION 2: UNDERSTANDING THE MONGOOSE SYSTEM

Rane understands the pain and expense of pulling and managing miles of analog cable throughout a large audio installation, not to mention the potential for inferior sound quality. The advent and rapid adoption of digital audio networking has almost ended this cabling and quality nightmare – but not quite. You have probably utilized one or more of the networking solutions that exist today – for example, CobraNet, Ethersound, and others. But, as discussed in the introduction, these solutions aren't appropriate in all situations. Because placing just a few channels on a large bandwidth network Bundle is inefficient and expensive, you are probably still using analog cabling in low channel count applications.

Since you're reading this manual, we can assume that you are seriously considering replacing all this cabling with less expensive shielded CAT 5e cables and distributing the audio digitally via a RAD network. Congratulations! You've made a wise choice. To help make this transition from analog to digital and from older audio technology to new, this section provides a thorough explanation of the entire Mongoose system – as well as suggestions for incorporating it into your larger audio system as efficiently as possible.

The Big Picture

Before diving into the details, let's take a look at the big picture. The following illustration shows an audio system that uses analog cables to connect scattered channels to the rack room equipment

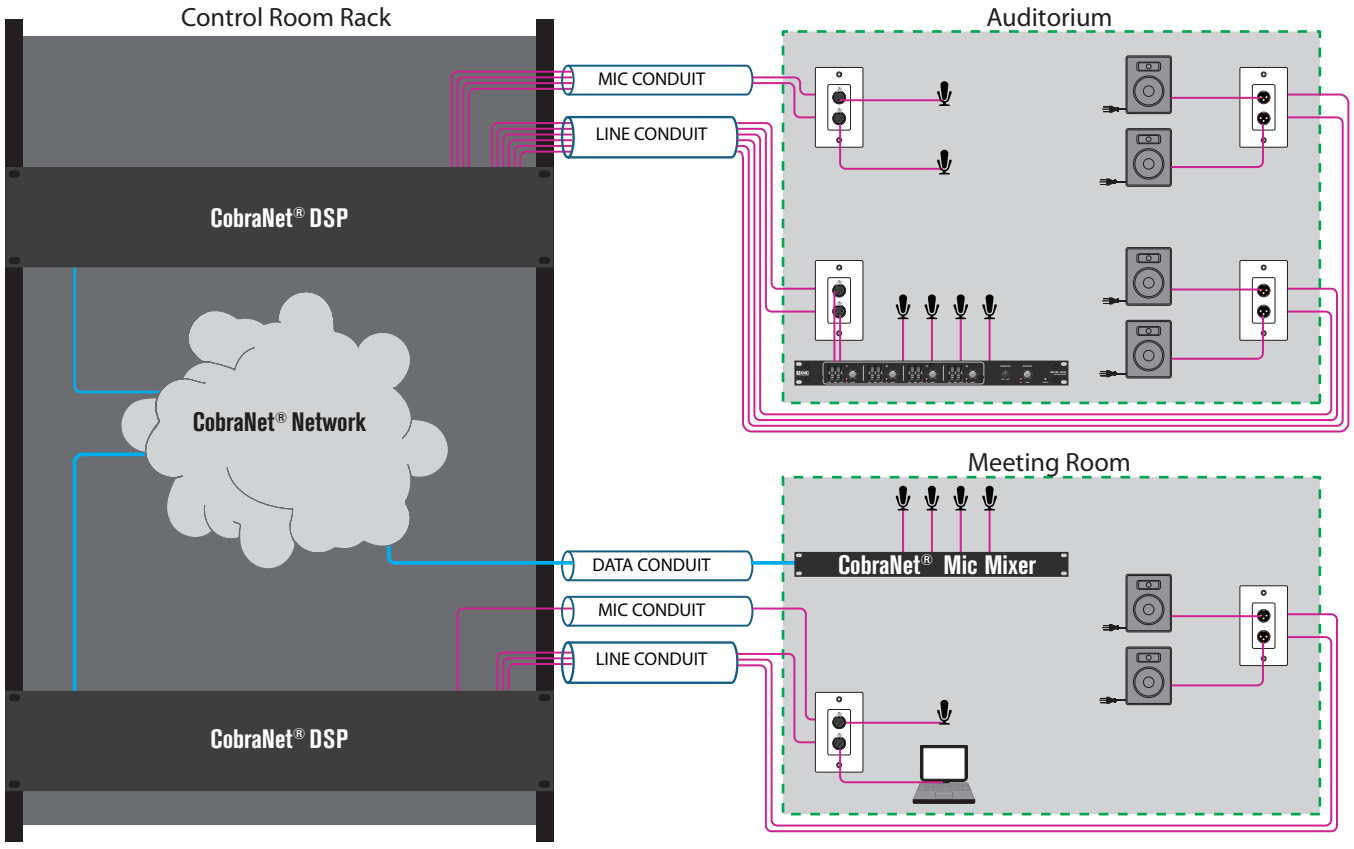

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Figure 1: Audio system using analog cables

Now take a look at the difference when you replace the analog connections with a RAD network:

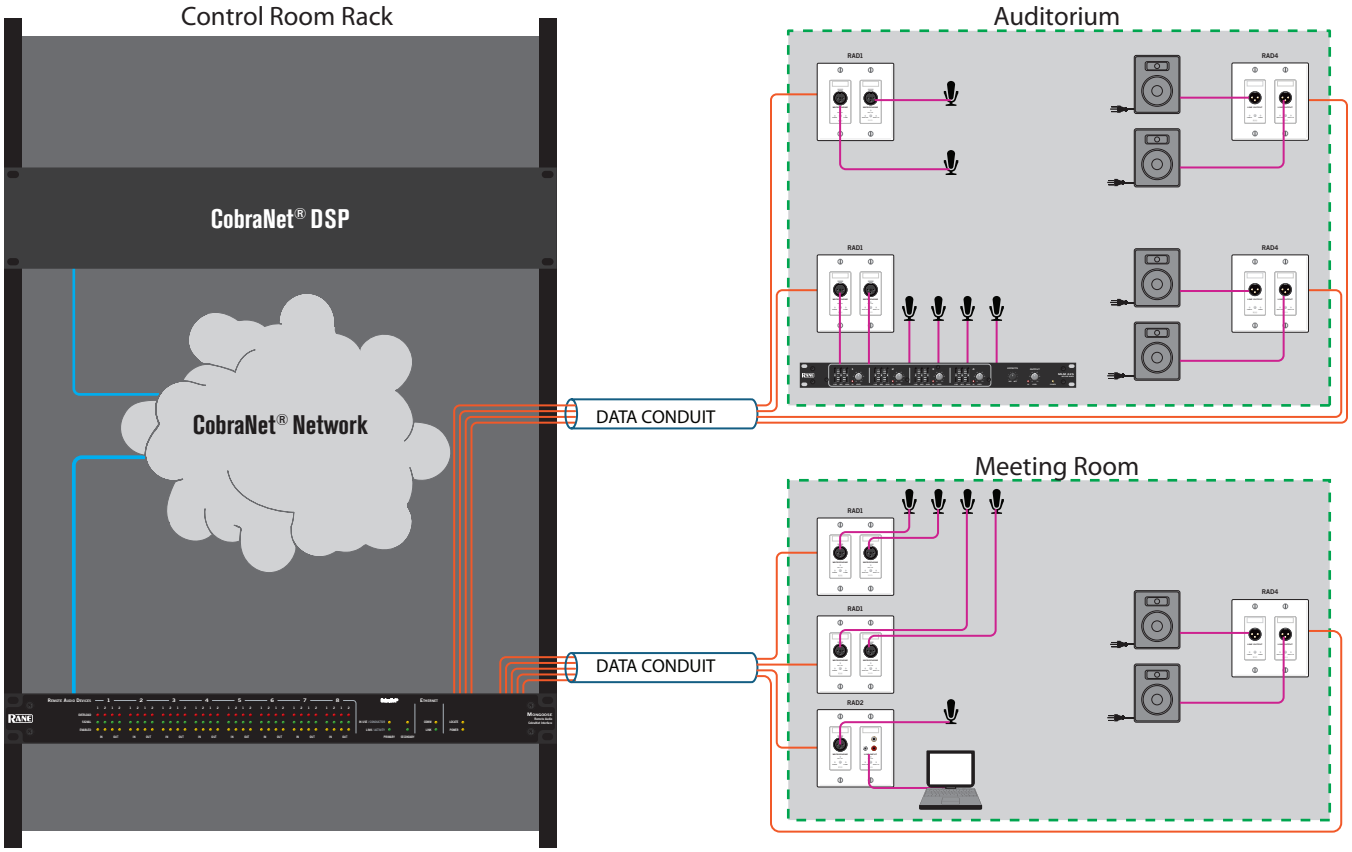


Figure 2: Audio system using Mongoose and RADs

As you can see, the Mongoose corrals and controls the low count channels in your audio system, aggregating them so you can more efficiently utilize your CobraNet network. Each RAD input amplifies, digitizes, and transmits the digital audio via CAT 5 to its host Mongoose, whereupon it can be routed to another RAD, to a CobraNet Bundle, or both. Each output RAD receives via CAT 5 a digital signal and converts it to analog for delivery to the attached device.

The specific details of the Mongoose and its associated RADs are explained in "Components of a Mongoose System" on page 9, but you may first want to review the primary advantages to implementing this system.

The Benefits of a Mongoose

To most effectively design a system containing a RAD network, you need to understand its benefits so you can take full advantage of them. For example, when using RADs, not only can you place line-level audio and a microphone within the same conduit, you can place it on the same cable!

Following is a brief discussion of how key aspects of an audio system are handled within a Mongoose system versus a typical analog system.

Less Expensive Cabling and Conduit

The foremost advantage of the Mongoose system is its use of CAT 5 cables for audio distribution. We don't have to tell you the cost benefits of using CAT 5 versus shielded audio cables and conduit. But bear with us. Since we're highlighting the benefits of a Mongoose, we'll expound a bit more on the cost savings. Not only is CAT 5 cable much less expensive than shielded analog cable, use of CAT 5 cable eliminates the need for conduit. In addition to that, a RAD can transmit up to four channels (two input, two output) over one CAT 5 cable. To top things off, the RAD is also able to transmit power and a data signal – all on that same CAT 5 cable. To provide all this functionality in an analog world would require pulling six times the amount of cabling needed by the RAD network as well as the use of conduit to house all that cabling! So not only is the medium itself less expensive, but the difference in time and labor costs is huge. As a matter of fact, by using CAT 5 cables, it may be possible for some economies of scale – why not have the IT folks pull and terminate your CAT 5 cable at the same time they pull the data wires for the building?

Simpler Cable Termination

Your installers will be happy to know that they can toss their soldering irons aside. Terminating connections in the Mongoose system involves nothing more than the simple process of crimping CAT 5 cables. And unlike soldering, the crimping process does not require electricity.

An added benefit is the automatic testing that the Mongoose performs on each connection. When the installer terminates and connects the CAT 5 cable to the RAD, the Mongoose automatically tests the connection (assuming, of course, that the Mongoose is connected and powered on). The status of the connection is immediately reported via the status lights on the RAD. If there's a problem with the connection, it can often be solved by simply re-crimping the cable – a much easier process than having to re-solder a connection.

Better Sound Quality

Susceptibility to noise interference is much greater with analog than with digital transmission. Replacing your analog channels with a RAD network immediately provides you with far superior sound quality – especially if you're transmitting the signal over substantial distances. In addition to eliminating noise interference, the RAD's transmitters and receivers have a high common mode range.

Digitizing the audio at the wall eliminates the mounting, expense, and trouble of isolation transformers traditionally used in analog applications. Plus, passing low frequencies through analog isolation transformers requires large cores and therefore more space. RADs save the space and pass those low frequency Barry White vocal pronouncements to your application's dual 18-inch subwoofers without compromise.

Simpler and Faster to Change Audio Routing

In an analog system, audio is often routed by hardwiring the necessary connections. Therefore, to change the routing, you must change the wiring – often a tedious and time-consuming process. With the Mongoose system, however, the audio routing is handled by software. To change the routing, you simply point and click within the Mongoose software application. Audio routing changes are literally as simple as the click of a mouse.

Easier Troubleshooting

Have you or your installers ever been baffled by an audio connection that fails to work? You've pulled all the cables, installed all the equipment, and, when you flip the switch, you hear silence instead of the glorious sound you expected. You must then retrace your steps and try to locate the problem. In an analog system, wiring mistakes and broken cables can be quite difficult to troubleshoot. The ends of the wires are often hundreds of feet apart in completely different rooms. In a RAD network, the equipment contains status indicators that immediately notify you if there's a problem. For example, on a single RAD, a power indicator tells you if a power signal is present, a communications indicator tells you if a data signal is present, and an Audio Rx and an Audio Tx indicator tell you if an incoming or outgoing audio signal is present. The Mongoose itself contains numerous status indicators as well. And the Mongoose Tracker software, used primarily for configuring the system, provides even more troubleshooting information, allowing you to troubleshoot your system from one location!

Components of a Mongoose System

A Mongoose system contains three primary components:

1. The *host device* (called the Mongoose) to which you can connect up to eight RADs. You can then connect the Mongoose to your Ethernet network (for setup and control) and to additional CobraNet-enabled audio equipment. The Mongoose is typically located in the audio rack room.
2. The *RADs* that serve as the input/output devices located in the rooms in which you want to send or receive audio.
3. The *Mongoose software* (called the Mongoose Tracker), which you use to configure and troubleshoot the system.

Another key player in a Mongoose system is the CobraNet network. Although there may be a few scenarios in which CobraNet is not required (for example, sending audio from one RAD to another RAD on the same Mongoose), in most applications you will want to take advantage of the power of CobraNet. Combining a RAD and CobraNet network allows you to digitize and aggregate scattered channels and efficiently route them to any location within the entire audio system.

The Mongoose Host Device

The primary purpose of the Mongoose host device is to connect up to eight RADs to a CobraNet network. It is typically housed in the audio rack room along with the DSP and other audio equipment. In addition to hosting the RADs, the Mongoose does the following:

- Provides power to the connected RADs
- Stores configuration settings for itself and for each of the connected RADs
- Provides a connection to an Ethernet network (for control of the Mongoose and RADs)
- Provides connections to both a primary and secondary (backup) CobraNet network
- Displays various status indicators (LEDs) providing information about the health of the system

Front Panel Description

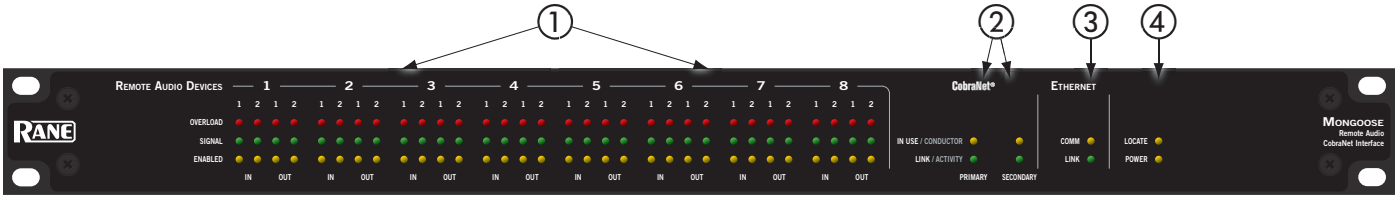


Figure 3: Front panel of the Mongoose

① The **Remote Audio Devices status indicators** provide information about the RAD audio channels. The numbers 1 through 8 at the top of the front panel correspond to the RAD ports 1 through 8 on the back of the Mongoose. For example, the status indicators for number 1 provide information about the RAD connected on port 1.

Under each RAD number are four audio channels, two input and two output. These represent the maximum number of channels a RAD is capable of transporting. However, not all RAD models use all four channels. For example, the RAD1 model provides two microphone inputs, so for that model, only the two columns of indicators labeled IN would be active.

There are three types of indicators:

- **Overload** LED (red) –indicates that the channel is experiencing a signal overload.
- **Signal** LED (green) – indicates the presence of an audio signal on this channel
- **Enabled** LED (yellow) – indicates the availability of the associated audio channel. If a RAD is connected on this port and all Enabled lights are off, this indicates a problem with the CAT 5 connection or with the RAD. If the Enabled LEDs are flashing, this indicates that the physical RAD model does not match the RAD model specified for this port in the Mongoose's configuration.

② The **CobraNet status** indicators provide information about the Mongoose's CobraNet connection. There are two sets of indicators for each CobraNet network – **Primary** and **Secondary**. Of course, the secondary network indicators function only if you have implemented a secondary (or backup) CobraNet network.

- **In Use/Conductor** LED (yellow) – indicates that the CobraNet port is in use, in other words CobraNet packets are being sent or received by the Mongoose. If the Mongoose has auto-negotiated to be the CobraNet Conductor, this LED flashes (indicating it is both in use and is the Conductor). If you have connected both the primary and secondary CobraNet ports, only one of your CobraNet networks will be active (or in use) at any given time, therefore, only one In Use/Conductor indicator will be active.
- **Link/Activity** LED (green) – indicates the CobraNet network is connected, and flashes if there is activity on the network. If the Mongoose is connected to another CobraNet device or network switch but the Link LED is off, this indicates a problem with the connection. If you have connected both the primary and secondary CobraNet ports, the Link LED for both ports should be on.

③ The **Ethernet status** indicators provide information about the Mongoose's Ethernet connection.

- **Comm** LED (yellow) – flashes when the Mongoose is sending or receiving network packets to or from the Mongoose Tracker software.
- **Link** LED (green) – indicates if the Ethernet network is connected. If the Mongoose is connected to an Ethernet network but the Link LED is off, this indicates a problem with the connection.

  Note: If an installation does not include an Ethernet network, this indicator is relevant only when you connect a computer directly to the Mongoose. If the connection is working properly, the Link LED lights up.

④ The remaining indicators on the front panel are the **Locate** and **Power** LEDs:

- **Locate** LED – flashes green when you place this device in Locate Mode (via the Mongoose Tracker software). The purpose of this locate functionality is for verification, when working in the software, of the physical device you are configuring or viewing. This is helpful when you are working with multiple Mongoose devices. For more information about this functionality, see the software help system.
- **Power** LED – indicates the Mongoose is powered on.

Rear Panel Description

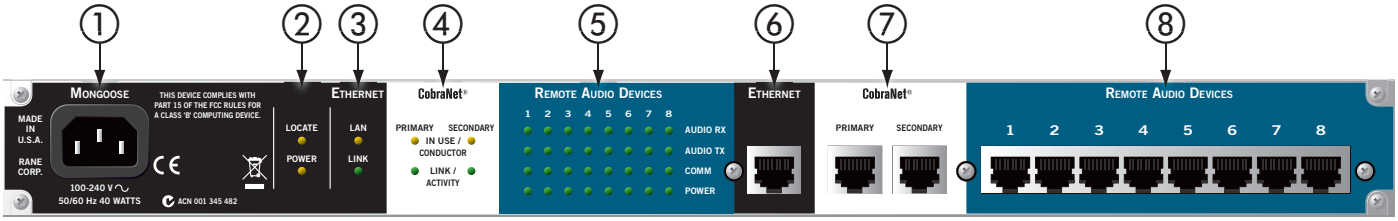


Figure 4: Rear panel of Mongoose

① **Power IEC jack** – connects to AC line voltage, 100-240 V, 50-60 Hz.

② The **Power** and **Locate LEDs** on the back panel serve the same purpose as those on the front.

③ The **Ethernet Link LED** on the back panel serves the same purpose as the one on the front. The **Ethernet LAN LED** flashes when the Mongoose detects any Ethernet packets on the network.

④ The **CobraNet LEDs** (**In Use/Conductor** and **Link/Activity**) on the back panel serve the same purpose as those on the front.

⑤ The **Remote Audio Devices LEDs** on the back panel serve a different purpose from the ones on the front. The front panel LEDs provide information about signal activity on each audio channel. The back panel LEDs indicate the health of the CAT 5 connection between each RAD and the Mongoose. Just as on the front panel, these LEDs are numbered 1 through 8 which correspond to the numbered ports on the device. Each LED corresponds with one twisted pair within the CAT 5 cable. If the twisted pair is functioning properly, the LED displays a solid green light.

- **Audio Rx LED** – lights solidly if the Mongoose's receive pair is working properly.
- **Audio Tx LED** – lights solidly if the Mongoose's transmit pair is working properly.
- **Comm LED** – lights solidly if the RAD's data communications pair is working properly.
- **Power LED** – lights solidly if the Mongoose is supplying adequate power to the RAD port.

⑥ **Ethernet port** – used to connect the Mongoose to an Ethernet switch or directly to a computer. Note that this Ethernet port contains auto-MDIX functionality, which means that if you connect directly from this port to a computer, you can use either a standard Ethernet patch cable or a crossover cable to make the connection. The auto-MDIX functionality takes care of coordinating the proper connection between the devices.

⑦ **CobraNet ports** – used to connect the Mongoose to another CobraNet-enabled device or to a network switch. Use the **Primary** port to connect your primary CobraNet network. If you have a backup CobraNet network, connect the Mongoose to it using the **Secondary** port. Both ports have the same Media Access Control (MAC) address. Note that the CobraNet ports do NOT contain auto-MDIX functionality. Therefore, if you use this port to connect the Mongoose directly to another CobraNet device, you MUST use a crossover cable.

⑧ **Remote Audio Devices ports** – used to connect each RAD to the Mongoose via a standard CAT 5 cable. You must use a standard Ethernet patch cable for this connection.

Mongoose Block Diagram

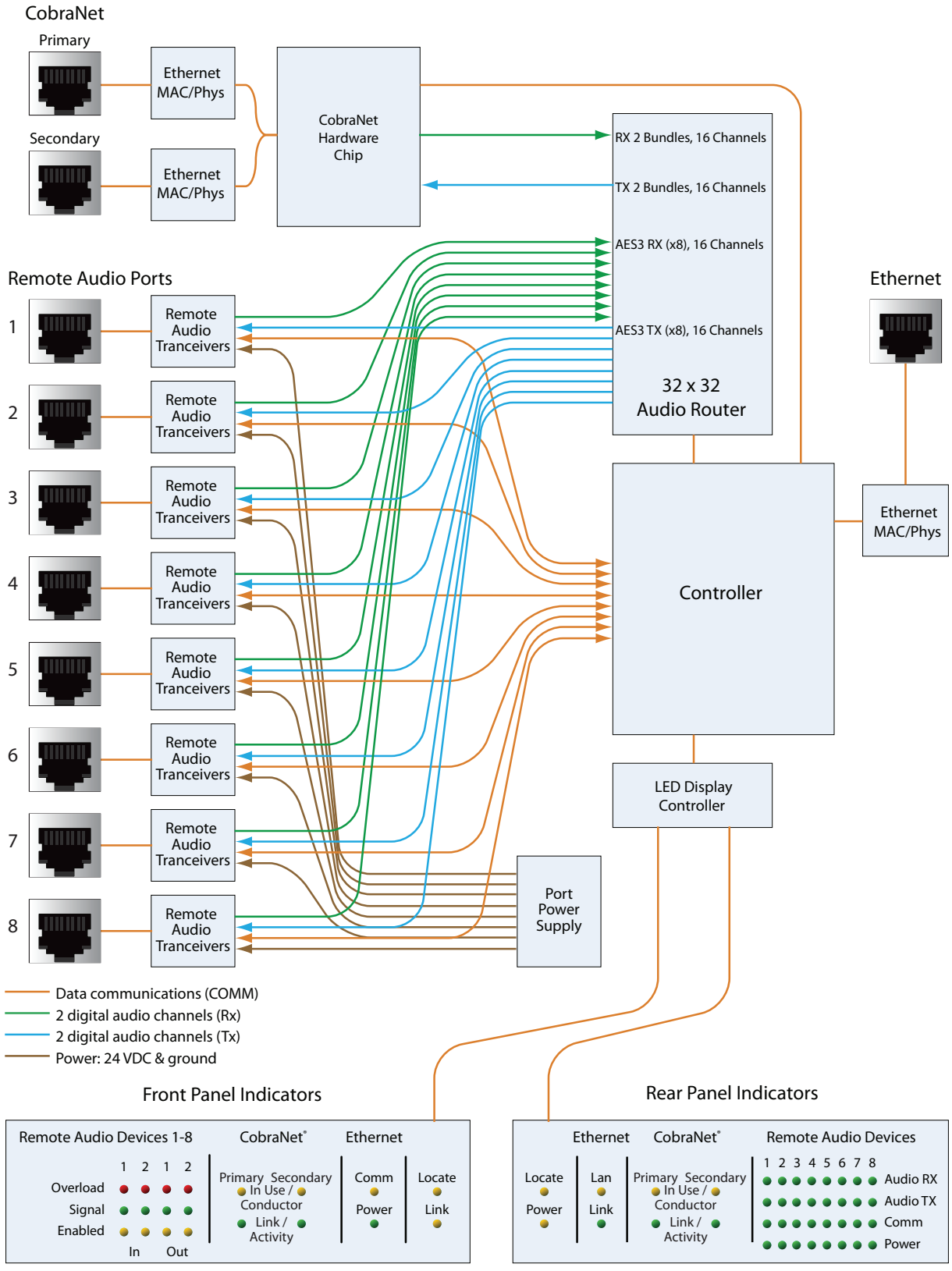


Figure 5: Block diagram of Mongoose

Remote Audio Devices

The primary purpose of a Remote Audio Device (RAD) is to amplify, digitize, and transmit a digital audio signal via shielded CAT 5e cable to a Mongoose host device. RADs can also receive a digital signal from the Mongoose and then convert it to analog before sending it to its attached audio equipment. RADs are capable of transmitting and receiving up to four channels of digital audio (two in each direction). To better fit your needs, however, Rane offers various RAD models. Some of these models handle a maximum of two input or two output channels. Most RAD models are designed to fit in a standard U.S. two, three, or four gang switchbox. For the most recent list of RAD models available, see www.rane.com/mongoose.

The CAT 5 cable that connects the RAD to the Mongoose also provides power to the RAD as well as a path for data communications. This makes it possible to control the RAD's configuration settings, view status information, and update a RAD's firmware – all from the host Mongoose. The following picture illustrates how the four twisted pairs within the CAT 5 cable are utilized:

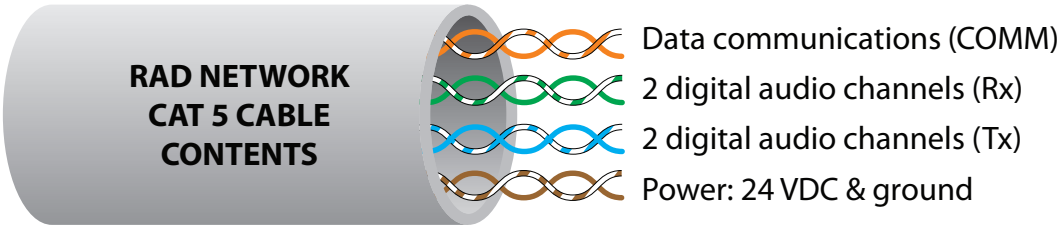


Figure 6: Purpose of each CAT 5 twisted pair

The **orange pair** is reserved for data communications between the RAD and the Mongoose. Data communications is needed for such things as sending configuration information from the Mongoose to the RAD, sending firmware updates from the Mongoose to the RAD, and sending status information from the RAD to the Mongoose.
NOTE: Configuration information for a specific RAD (for example, LED intensity, microphone sensitivity, and RAD and channel names) is stored in the Mongoose, not in the RAD. This makes it easy to swap in a new RAD, if necessary, without losing configuration data.

The **green pair** carries two channels each of balanced, differential, digital audio. *Rx* refers to audio that the RAD receives from the Mongoose.

The **blue pair** carries two channels each of balanced, differential, digital audio. *Tx* refers to audio that the RAD sends to the Mongoose.

The **brown pair** provides 24 VDC power and ground for the RAD. This is obviously the wire you should check if it appears a RAD is not receiving power.

Typical RAD Front Panel

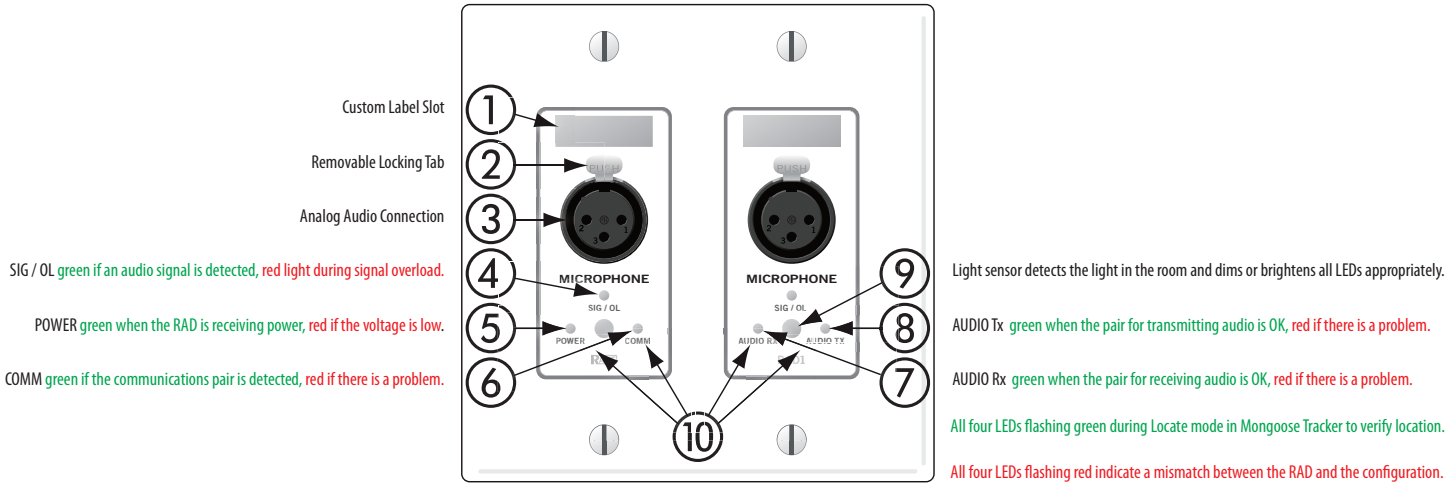

Custom Label Slot
Removable Locking Tab
Analog Audio Connection
SIG / OL green if an audio signal is detected, red light during signal overload.
POWER green when the RAD is receiving power, red if the voltage is low.
COMM green if the communications pair is detected, red if there is a problem.
MICROPHONE
SIG / OL
POWER
COMM
AUDIO Rx
AUDIO Tx
Light sensor detects the light in the room and dims or brightens all LEDs appropriately.
AUDIO Tx green when the pair for transmitting audio is OK, red if there is a problem.
AUDIO Rx green when the pair for receiving audio is OK, red if there is a problem.
All four LEDs flashing green during Locate mode in Mongoose Tracker to verify location.
All four LEDs flashing red indicate a mismatch between the RAD and the configuration.

Figure 7: Remote Audio Device

① **Label** – a location on the RAD for inserting a custom label of the input, output or channel number associated with the corresponding jack. See "Generating RAD Labels" on page 58 for details.

② **XLR tab** – push tab for releasing a microphone cable. This tab may be removed – details are in the Mongoose Installation Manual.

③ **Input/Output jacks** – the actual jacks to which you connect the appropriate audio device(s). The jacks differ based on the RAD model.

④ **SIG/OL LED** – displays a green light when an audio signal is detected, displays a red light when the channel is experiencing a signal overload.

⑤ **Power LED** – displays solid green when the RAD is receiving power, turns solid red if the voltage received is lower that expected.

⑥ **Comm LED** – displays solid green when the RAD detects the communication pair of wires and communication is established between the Mongoose and RAD. The LED displays solid red if the RAD cannot communicate with the Mongoose, likely due to a communication pair wiring problem.

⑦ **Audio Rx LED** – displays solid green when the RAD detects that the pair of wires for receiving audio is functioning properly, regardless of the RAD model, displays red if there is a problem.

⑧ **Audio Tx LED** – displays solid green if communication with the Mongoose has been established and the Mongoose informs the RAD of the Tx Audio lock. The light displays solid red, if there is a problem communicating with the RAD or if there is a problem with the Audio Tx pair of wires.

⑨ **Light sensor** – detects the amount of light in the room and dims or brightens all LEDs appropriately. If the room where the RAD is installed is very dark and the “Allow LEDs to turn off” option is enabled, the LEDs will go completely dark. If this is the case and you need to see the lights, simply shine a light (from a flashlight or some other source) on the RAD. Note that you cannot permanently turn these lights off manually. This is by design. We wanted to avoid the possibility of anyone thinking the RAD is defective (because the power light is off) and attempting to replace it unnecessarily.

⑩ **Locate mode** (all four flashing green) – Mongoose Tracker has a feature to verify the physical location of a specific RAD or Mongoose. When a RAD is placed in Locate mode, the Power, Comm, Audio Tx, and Audio Rx LEDs on the front of the corresponding RAD flash green. Flashing continues until you cancel the request in the software, place another RAD in Locate mode, interrupt the connection between the computer and Mongoose, disconnect the RAD, or power cycle the Mongoose.

⑩ **Mismatch mode** (all four flashing red) – When a RAD is connected to a RAD port on the back of a Mongoose device a comparison is made between the physical RAD model and the RAD model specified for this port in the Mongoose’s configuration. If there is a mismatch the Power, Comm, Audio Tx, and Audio Rx LEDs on the front of the corresponding RAD flash red.

Typical RAD Back Panel

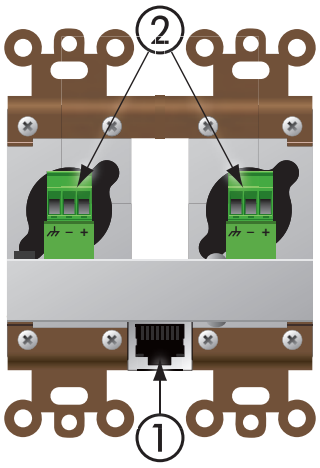


Figure 8: Back of a RAD

① RJ-45 (8P8C) jack for the CAT 5 cable.

② Euroblock connectors to use if paralleling microphone jacks

(**Disclaimer:** As it is poor design to plug two microphones into a single microphone input, we do not recommend this practice. If, however, you have a situation that warrants it, proceed with caution. We recognize that paralleling microphone jacks can lower the cost of your audio system.)

NOTE: RADs are *hot-swappable*. In other words, you can replace a RAD without having to power down the system. The Mongoose automatically detects the new RAD and configures it using the configuration data stored in the Mongoose. If the configured RAD and the physical RAD do not match, the Mongoose front panel **Enabled** LEDs for this RAD flash yellow. At the same time, the RAD's **Power**, **Comm**, **Audio Rx** and **Audio Tx** flash red during a mismatch.

Mongoose Tracker Software

The Mongoose Tracker allows you to configure and troubleshoot the RADs and Mongoose devices in your system. The software is shipped with the Mongoose product. It is also available free of charge on the Rane website. To run the software, you must have Microsoft Windows® XP, Vista or 7 on your computer. To communicate with your Mongoose, you must connect your computer to the appropriate network switch or use a standard Ethernet patch cable (or a crossover cable) to connect it directly to a Mongoose.

Using the Mongoose Tracker, you configure each Mongoose RAD port with the RAD model that should be connected to it. You also configure various settings for each RAD, for the Mongoose itself, and for the CobraNet network. One of the key configuration tasks is to set up the audio routing for your Mongoose system. You do this using the audio routing matrix that appears in the Mongoose Tracker's main window. This matrix is explained further in the next section. You can also find more information in the software's help system on working with the matrix.

In addition to configuring the Mongoose components and the audio routing, the software is a valuable tool for troubleshooting any issues that may arise. Although you can determine a lot from the hardware status indicators, the software provides more detail, allowing you to drill down and pinpoint the problem with greater accuracy.

Following is an annotated screen shot of the Mongoose Tracker's main window:

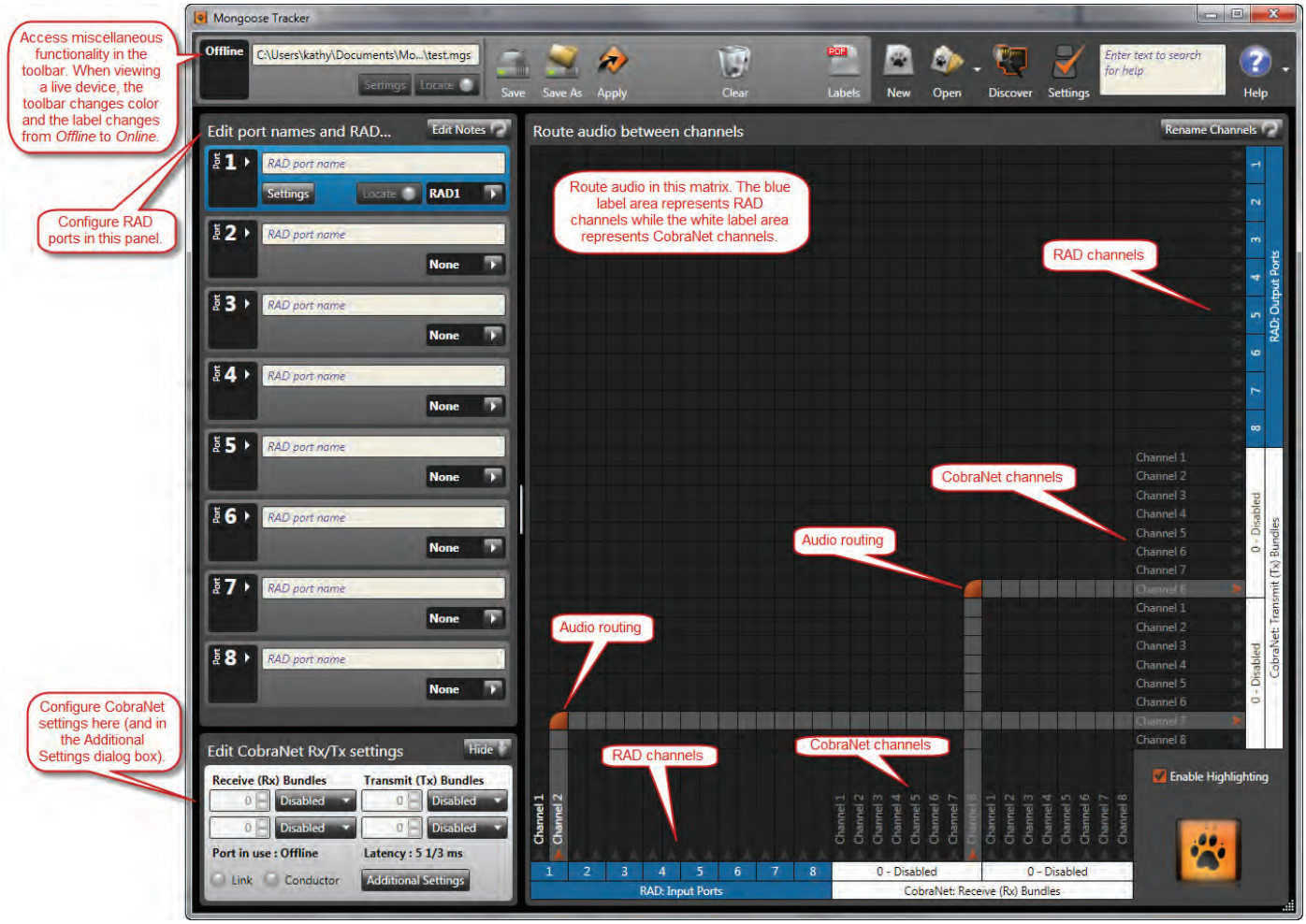


Figure 9: Mongoose Tracker main window

Understanding how the Audio is Routed

Understanding how the audio signal finds its way back and forth between a RAD and the host Mongoose is fairly straightforward. It's literally a direct connection. But where does it go from there and how do you control it?

Depending on your audio system, there are several options for routing a RAD audio signal. You can send the signal to one or more of the following:

- Another RAD connected to the same Mongoose
- Another RAD connected to a different Mongoose
- Another CobraNet-enabled device (for example, a DSP device)

To configure the audio routing, you use the Mongoose Tracker routing matrix. The matrix contains an area for RAD channels and an area for CobraNet channels, allowing the routing of signals directly to and from RADs and/or to and from CobraNet Bundles. Following is a simplified picture of the matrix, illustrating how it is separated into RAD channels and CobraNet channels:

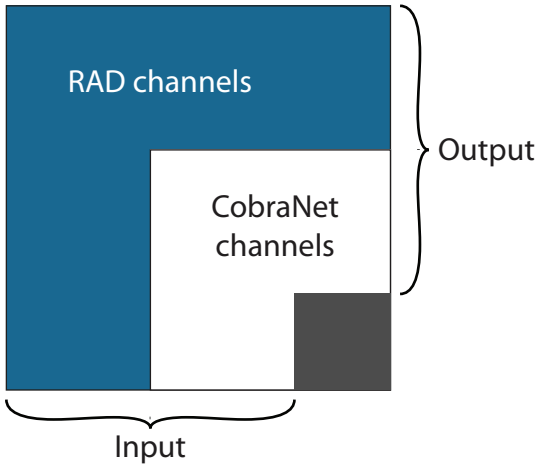


Figure 10: Simplified view of an audio routing matrix

An actual configured matrix looks like this:

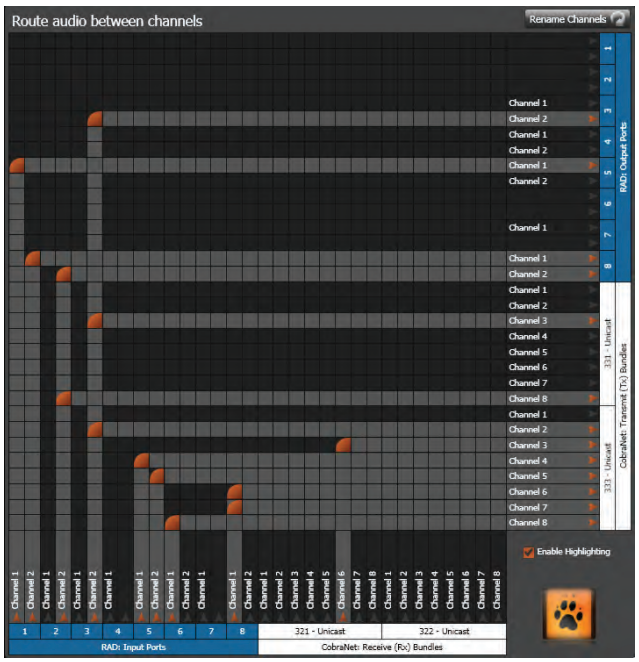


Figure 11: Mongoose Tracker audio routing matrix

As you can see, the matrix allows you to configure which RAD input and CobraNet receive audio channels are routed to which RAD output and CobraNet transmit audio channels.

To thoroughly understand the matrix, however, it is helpful to see the hardware view of various routing scenarios. The matrix can seem a bit abstract unless you have a solid picture in mind of what you're trying to achieve.

Each of the following routing scenarios includes four illustrations – two versions of the hardware view and two versions of the corresponding software matrix view. The first hardware view is high level while the second shows a more detailed view of the actual port connections involved. The first matrix illustration is a simplified view of the routing configuration while the second shows the actual configured matrix.

Note the color key in each of the detailed hardware graphics. The orange lines represent the physical connection between the RAD and its host Mongoose. The dotted red lines represent the virtual audio connection between devices. The blue lines represent the physical CobraNet connections between the Mongoose and the network switch and other CobraNet devices.

RAD to RAD routing (same Mongoose)

The following graphics illustrate a simple tie-line situation – routing audio between RADs that are connected to the same Mongoose.

Hardware view:

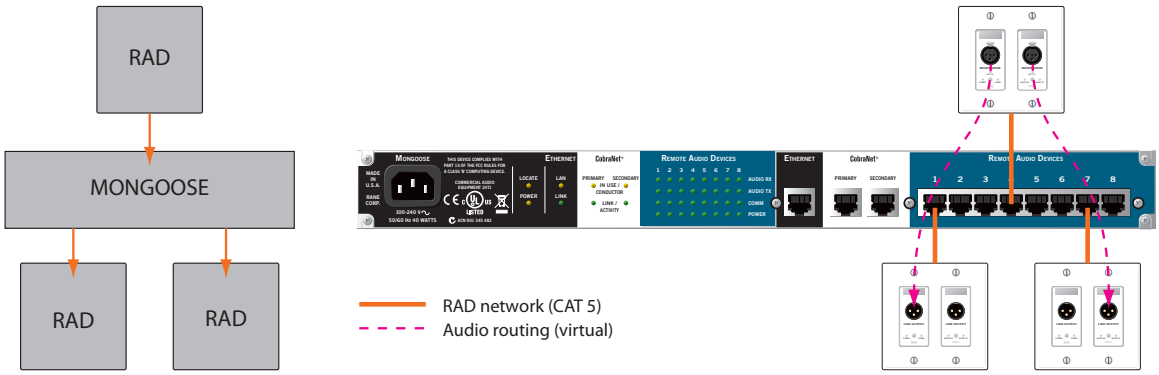


Figure 12: Hardware view of routing audio between two RADs that are connected to the same Mongoose

Matrix view:

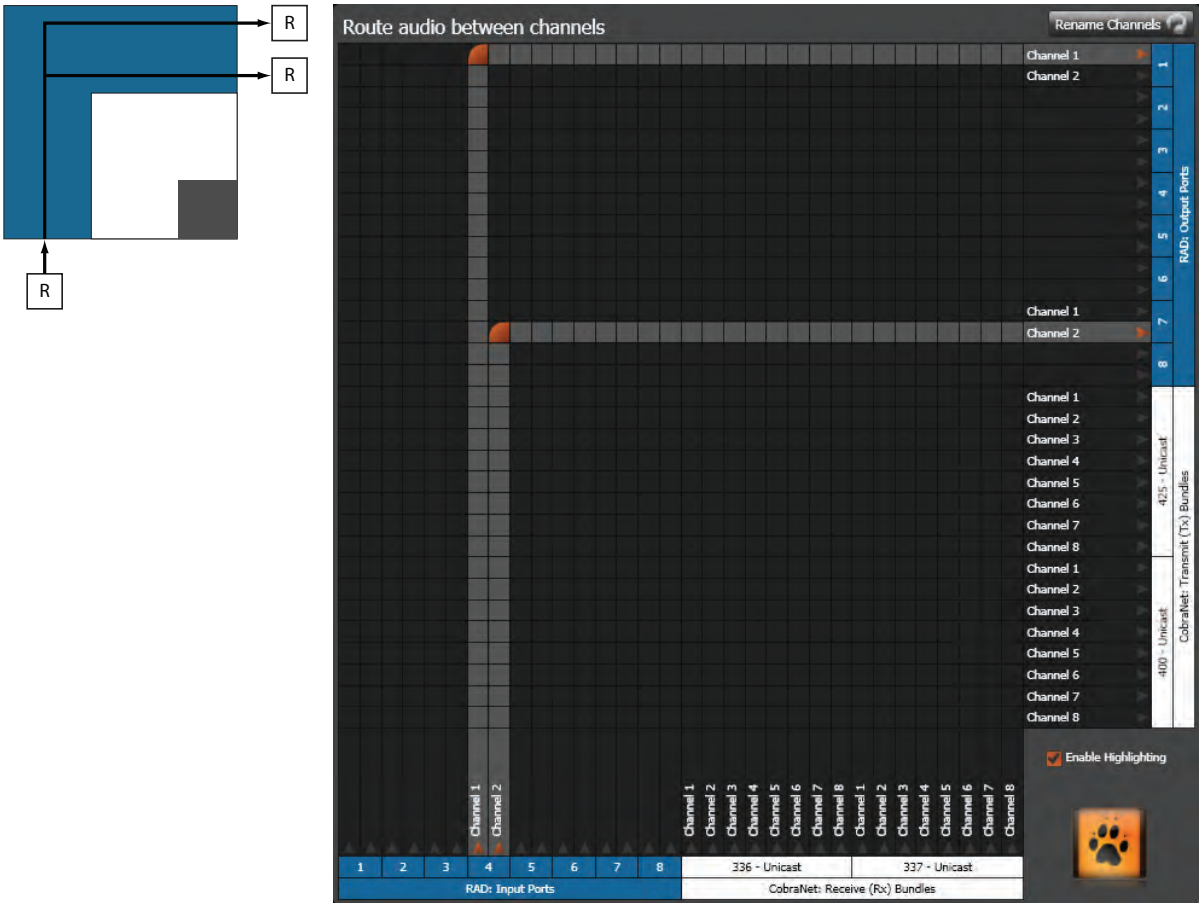


Figure 13: Simple view and actual view of matrix routing signal from RAD to RAD on a single Mongoose

RAD to RAD routing (different Mongoose)

The following graphics illustrate audio routing between RADs connected to different Mongoose devices.

Hardware view:

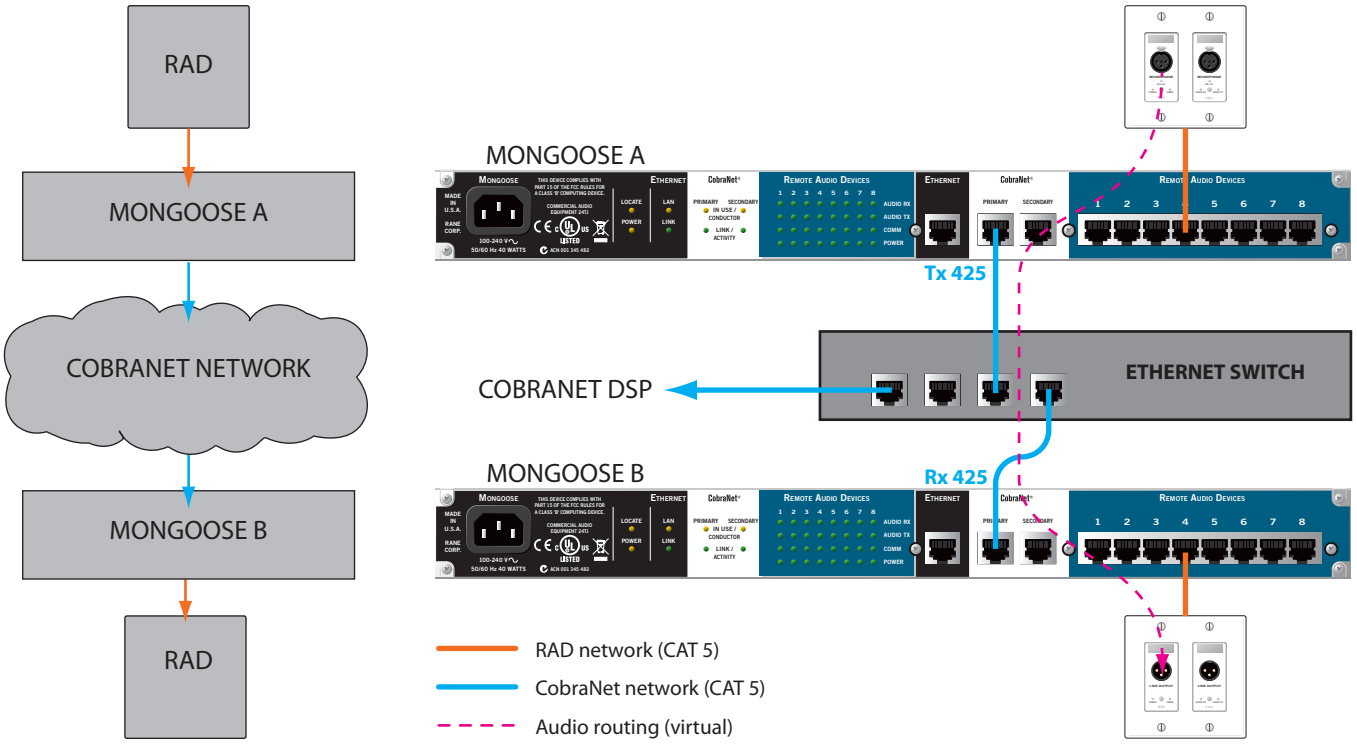
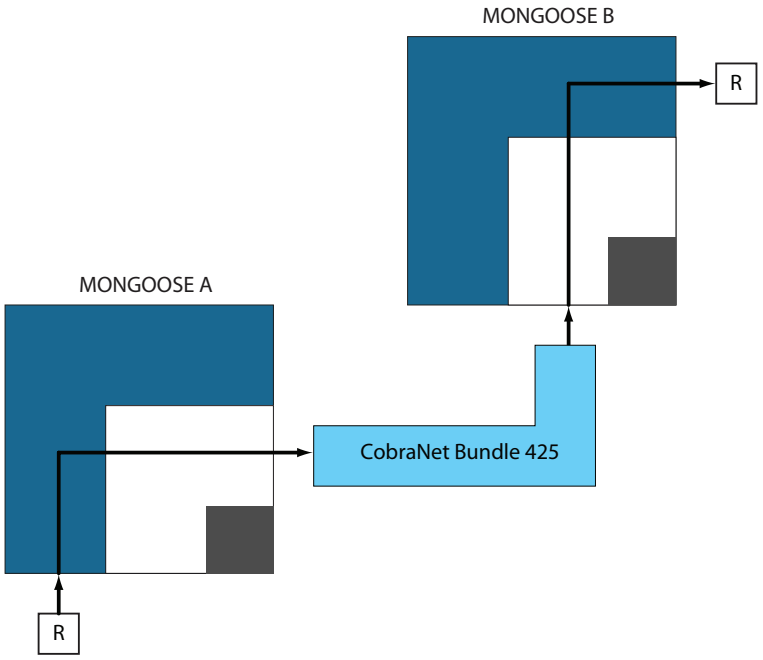
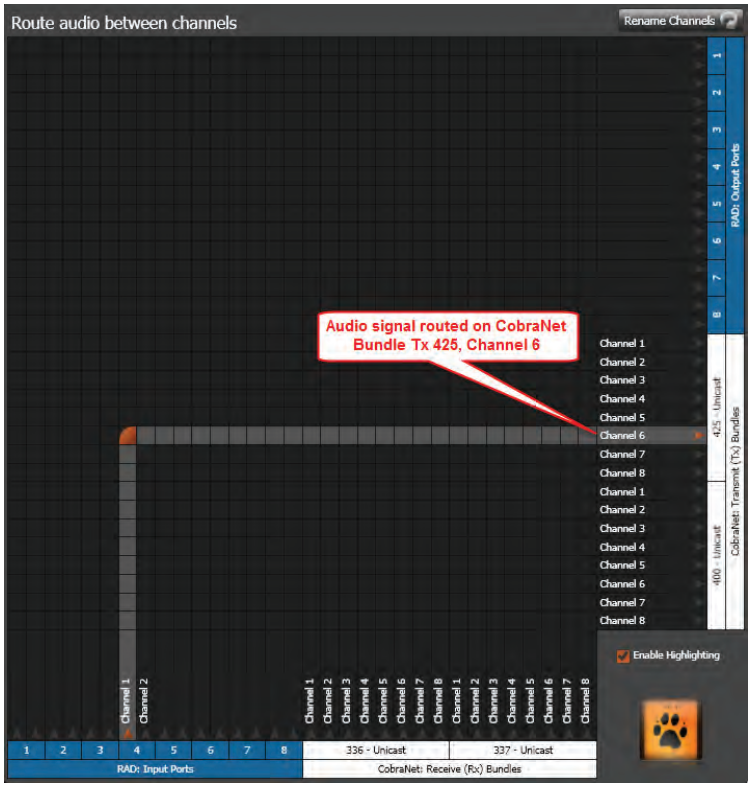


Figure 14: Hardware view of routing audio between two RADs that are connected to different Mongoose devices

Simplified Matrix view:



Mongoose A Matrix view:



Mongoose B Matrix view:

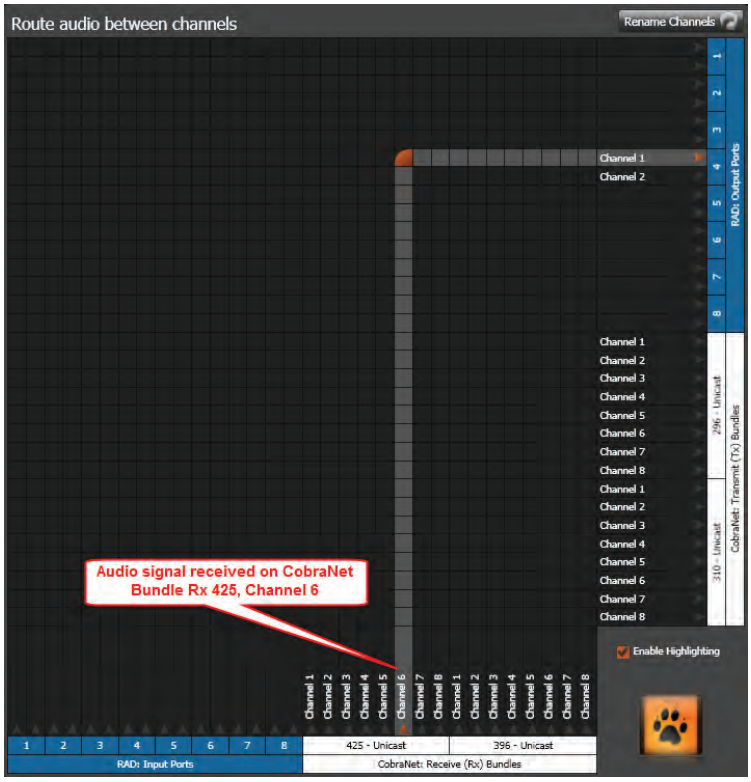


Figure 15: Simple view and actual view of matrices routing signal from RAD to RAD on different Mongoose devices

RAD to CobraNet device

The following graphics illustrate the routing of audio between a RAD channel and a CobraNet device.

Hardware view:

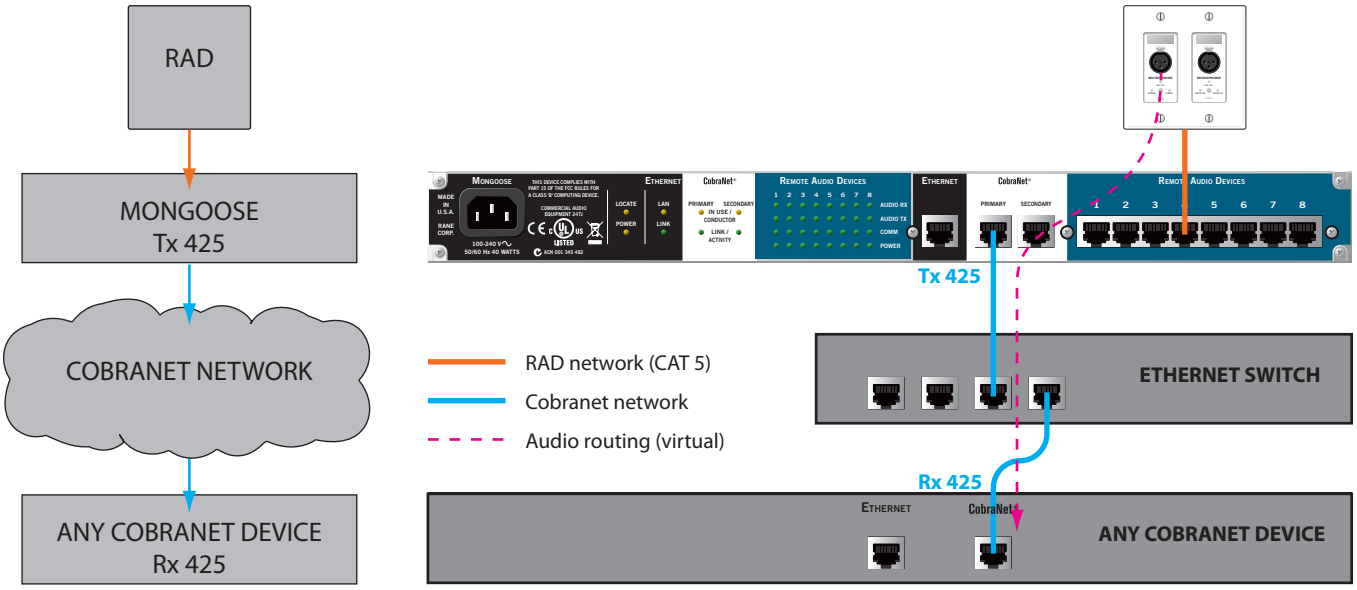


Figure 16: Hardware view of routing audio between a RAD and a CobraNet device

Matrix view:

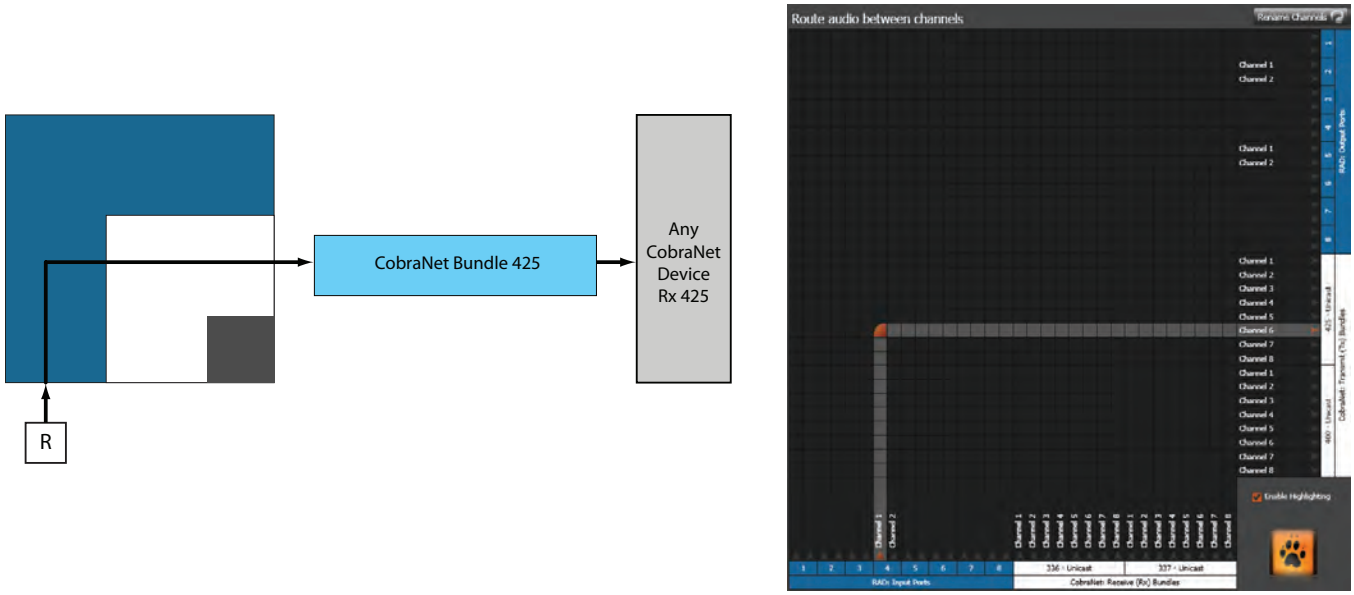


Figure 17: Simple view and actual view of matrix routing signal from RAD to CobraNet device

RADs from multiple Mongoose devices to a CobraNet device

The following graphics illustrate the aggregation of RAD channels from two Mongoose devices into a single CobraNet Bundle. These graphics are more complex than the previous ones, so we'll add more explanation.

In this scenario, one Mongoose transmits two RAD channels to another Mongoose via CobraNet. The second Mongoose combines two additional RAD channels (which are connected directly to the device) with the two RAD channels arriving from the first Mongoose (via CobraNet). These four RAD channels are then transmitted from the second Mongoose via a single CobraNet Bundle.

The high level signal flow view is self-explanatory. That is not the case with the detailed hardware view, however. The following procedure explains the numbered steps you see in the illustration:

1. Mongoose A receives the signal from four RAD channels.
2. Mongoose A transmits all four channels via CobraNet Bundle 300 (Tx 300).
3. Mongoose B receives CobraNet Bundle 300 (Rx 300).
4. Mongoose B receives the signal from four RAD channels.
5. Mongoose B transmits all eight RAD channels via CobraNet Bundle 301 (Tx 301).
6. Another CobraNet device receives all eight RAD channels via CobraNet Bundle 301 (Rx 301).

Hardware view:

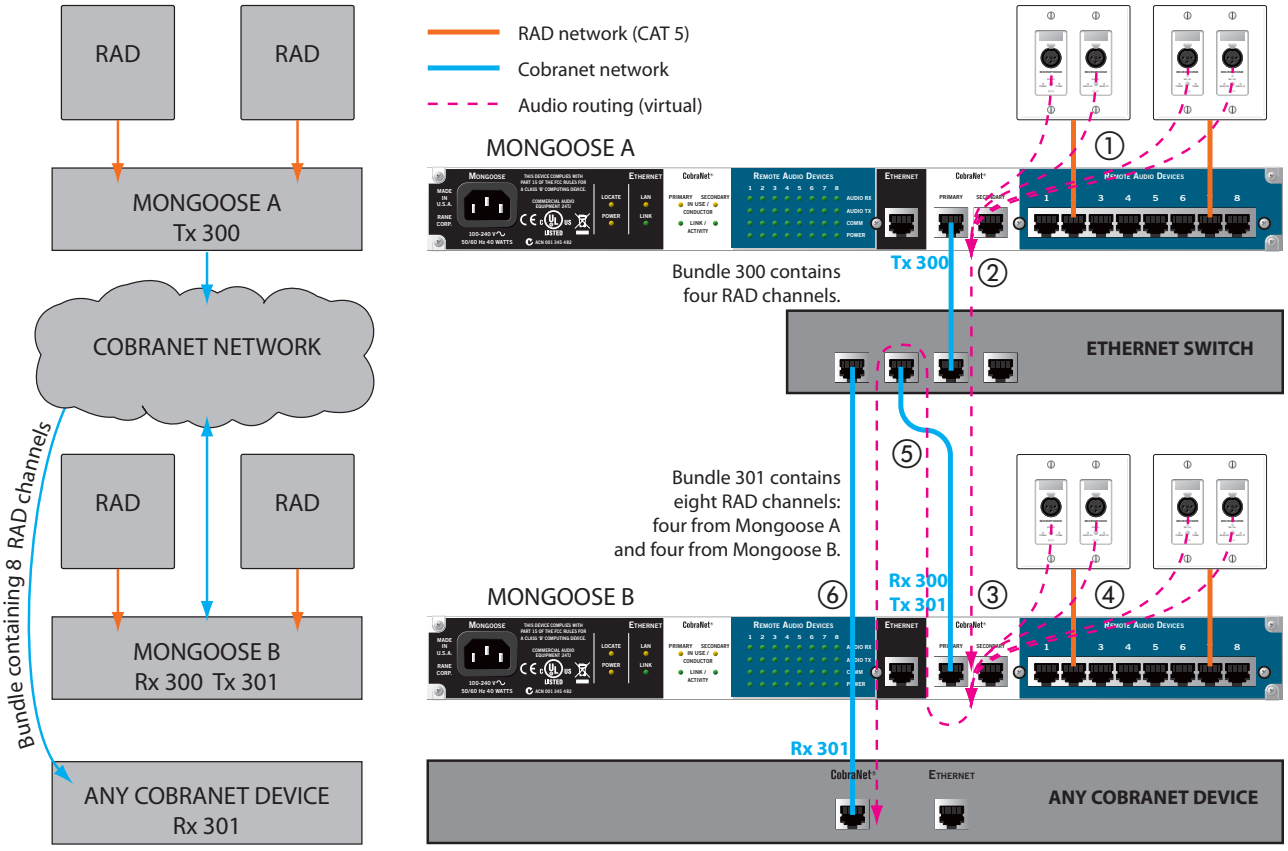
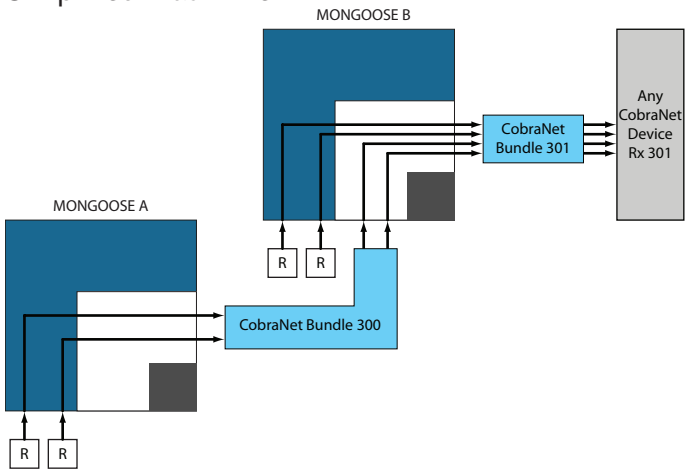


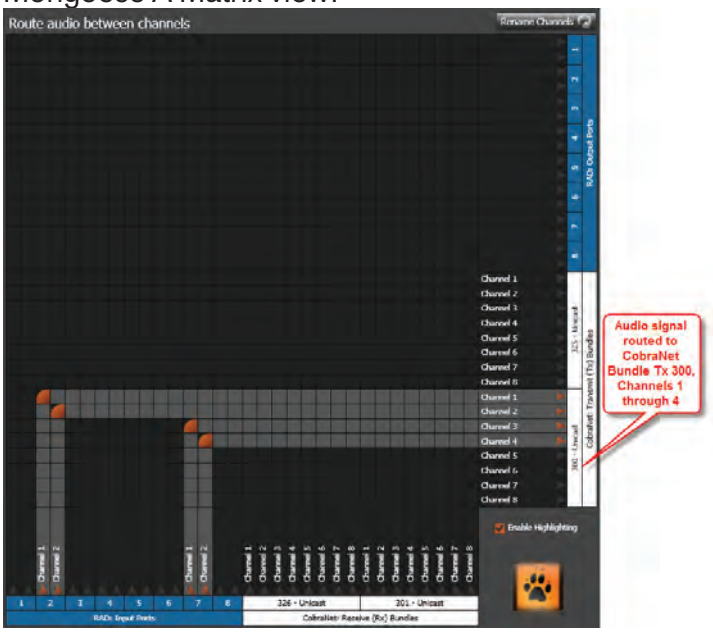
Figure 18: Hardware view of routing aggregated RAD signals from different Mongoose devices to a CobraNet device

Simplified Matrix view:



Note: In the above illustration, each line represents two channels.

Mongoose A Matrix view:


Route audio between channels
Rename Channels
Audio signal routed to CobraNet Bundle Tx 300, Channels 1 through 4
Enable Highlighting
326 - Unicast
301 - Unicast
RAD: Input Ports
CobraNet: Receive (Rx) Bundles

Mongoose B Matrix view:

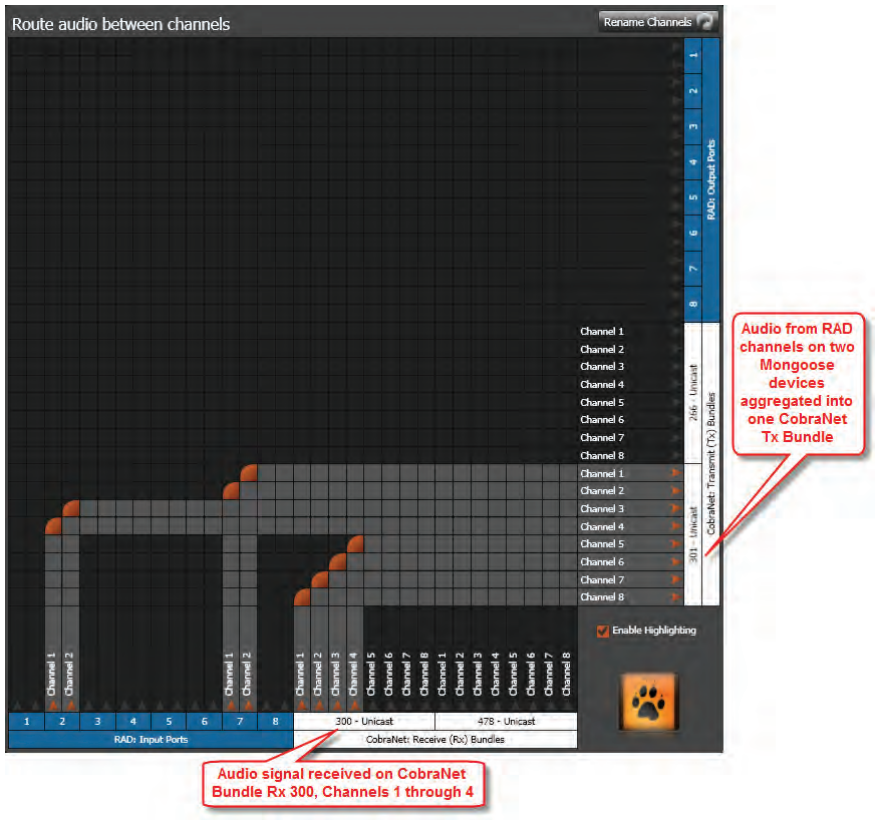

Route audio between channels
Rename Channels
Audio from RAD channels on two Mongoose devices aggregated into one CobraNet Tx Bundle
Enable Highlighting
300 - Unicast
478 - Unicast
RAD: Input Ports
CobraNet: Receive (Rx) Bundles
Audio signal received on CobraNet Bundle Rx 300, Channels 1 through 4

Figure 19: Simple view and actual view of matrices routing aggregated RAD signals from different Mongoose devices to a CobraNet device

SECTION 3: DESIGNING YOUR SYSTEM

Now that you have reviewed the basics, you are ready to begin designing this technology into an audio system. The purpose of this chapter is to provide tips and suggestions for incorporating RADs and Mongoose devices into your design. Also included are some sample applications and representative one-line drawings. Our hope is that one of these comes close enough to your situation that you'll have a head start with your own design. After completing this section, you should be well-equipped to create your design documents and construction documents. We'll start with a list of specific recommendations.

Tips and Recommendations

1. **In your system diagrams, use the Mongoose CAD drawings provided by Rane.**
   Rane provides CAD drawings of the Mongoose hardware (line art of the front and rear panels and shop drawings of a RAD and a Mongoose) for you to use in your drawings. The files are in the .dwg format, a format for AutoCAD. You can get these files from the Rane website, and on the CD that comes with the Mongoose. Also on the website and CD are more detailed color pictures of the hardware in a .jpg format. Following are examples of the CAD drawings:

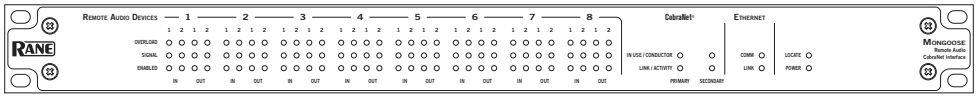


Figure 20: CAD drawing - Mongoose front

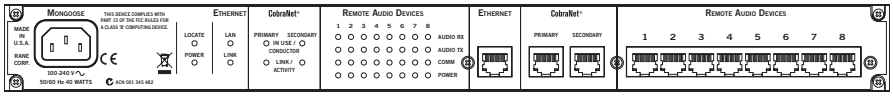


Figure 21: CAD drawing - Mongoose back

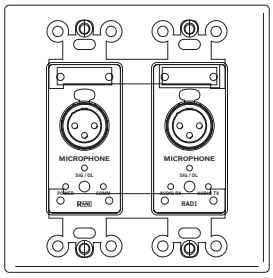


Figure 22: CAD drawing - RAD1

2. **Create the Mongoose configuration file during the design phase and provide this file to your installer.**
   We strongly recommend that you create a configuration file during the design process. You do not need any Mongoose hardware to create this file. All you need is the Mongoose Tracker software and a computer running Microsoft Windows® (see "System Requirements" on page 5). Providing this configuration file to your installers increases the efficiency and accuracy of their work. Simply include this file along with the other drawings and documentation that you give to your installers. See "Working with Configuration Files" on page 56 for more details.

3. **Be sure to design the routing of the CobraNet Bundles for your entire system during your planning.** You'll appreciate this when it is time to configure the Mongoose audio routing matrix!

4. **For large audio systems, consider using CobraCAD software to help with your network design.** CobraCAD is a software application that provides a simple graphical user interface for visualizing and designing CobraNet networks. Because it provides on screen visualization of the audio, Ethernet, and virtual Bundle connections throughout the entire network, it can be very helpful when designing large, complex systems. With CobraCAD, you can dynamically build a system on screen and perform design rule checking to catch errors. Note that CobraCAD is no longer actively supported, and therefore, does not contain Mongoose and RAD devices. It is still useful, however, for learning about CobraNet and for visualizing and planning a CobraNet network.

Key Design Decisions to Make

Following are a list of questions to consider when creating your Mongoose design.

1. **Does the audio system you're designing actually need the Mongoose technology?**
   If you read the introduction to this manual (or listened carefully to the Mongoose sales pitch), you understand the benefits of using a Mongoose system. Deciding which situations warrant its use is the trickier part. If your system contains any of the following characteristics, it's likely that the Mongoose would be beneficial.
   - The system needs to transmit and receive a small number of audio channels between a rack room and multiple, scattered locations.
   - The system requires digital transmission of the audio signal. This could be due to distance issues or simply the need for higher quality sound.
   - The total number of wall connections in the entire system is high. (Installing and testing a large number of analog wall connections requires a tremendous amount of labor.)

   The example applications in this manual (see "Example Applications" on page 29) further illustrate when and how to add Mongoose technology to an audio system. These examples also illustrate the conversion of generic one-line drawings to detailed drawings containing a Mongoose and RADs.

2. **What are the maximum distances you'll need to accommodate between a RAD and its host Mongoose and between a Mongoose and the network switch or other audio equipment?**
   The maximum distance allowed between a RAD and a Mongoose is 150 meters. If you need to accommodate larger distances, you may need to include multiple Mongoose devices in your installation, guaranteeing that there is a Mongoose within 150 meters of each RAD.

   In addition to this distance restriction between RADs and Mongoose devices, there is also the standard Ethernet distance restriction of 100 meters (if using CAT 5 cables) between the Mongoose and any other audio device (including another Mongoose) or network switch. If you need to accommodate a distance larger than 100 meters and are unable to use additional network switches, you could use fiber optic cable instead of CAT 5. If you choose to use multiple network switches, The maximum hops allowed in a CobraNet network (depending on the acceptable latency) is 6.

This graphic shows a CAT 5 scenario involving two Mongoose devices. In this situation, the maximum distance between the RADs would be 500 meters.

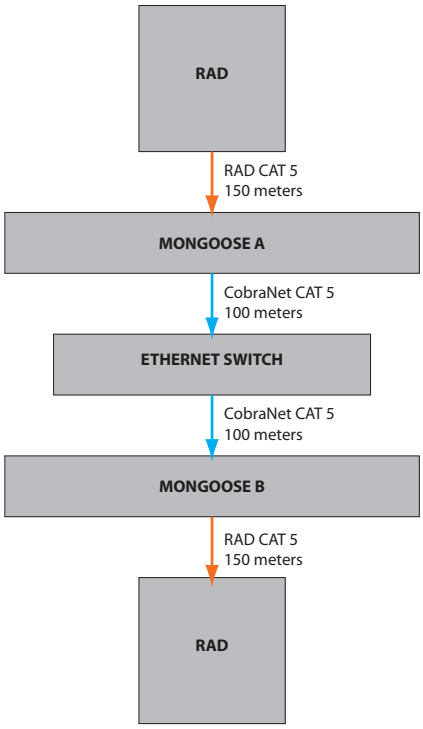


Figure 23: Maximum distance covered in CAT 5 scenario

The next graphic shows a scenario that uses both CAT 5 and fiber to connect RADs located in different buildings more than 100 meters apart.

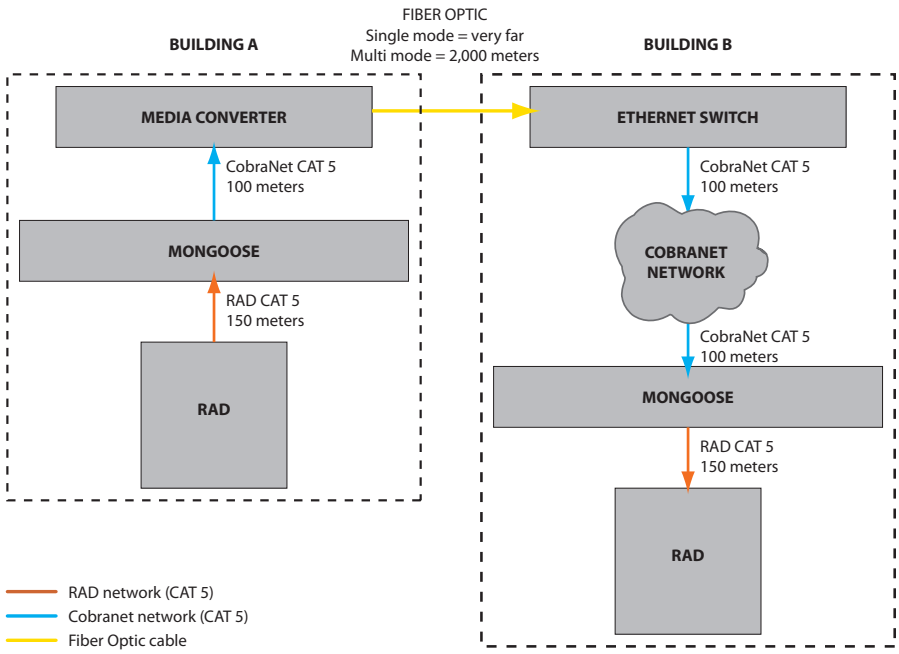


Figure 24: Maximum distances covered using fiber optic cable

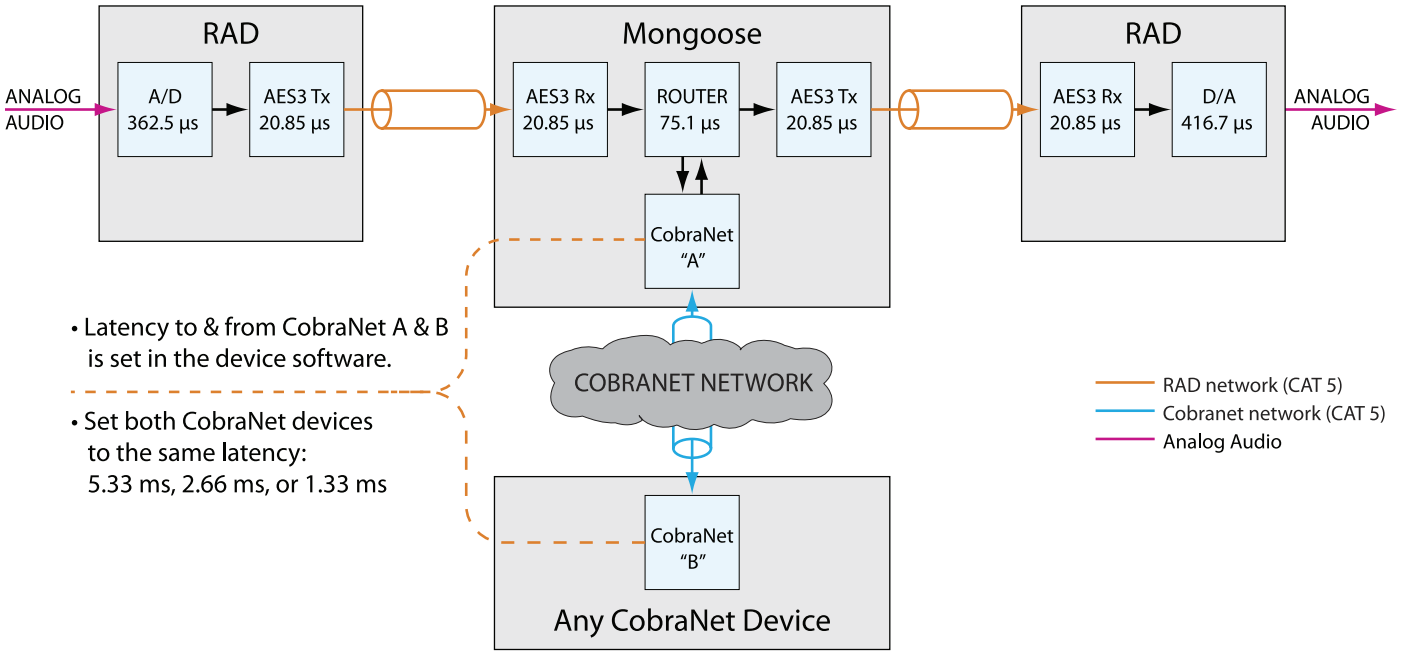
3. **How many Mongoose devices do you need?**
   Each Mongoose accommodates eight RADs. Therefore, deciding how many Mongoose devices you need requires just a little simple math. If distance is an issue, however, you may want to add additional Mongoose devices that you can place close to the RADs. See the previous question for more details about distance issues.

4. **What network design is appropriate for your situation?**
   When making networking decisions for the Mongoose system, you must think in terms of two different networks – the *control network* and the *CobraNet network*. The control network, which you connect to via the Mongoose Ethernet port, manages the communication between your computer and the Mongoose. You use this network for configuring and monitoring the Mongoose system. The CobraNet network, which you connect to via the Mongoose CobraNet port, manages the transmission of the digital audio signals. Depending on your situation, there are various ways to design these two networks. Unless your system is particularly large and complex, your network design should be fairly straightforward. There are enough issues to consider, however, that we have dedicated an entire section to this topic. See "Designing Each Network" on page 49.

5. **How do you plan to manage your CobraNet network?**
   You can use the Mongoose Tracker to manage several key CobraNet settings – the CobraNet transmit and receive Bundle numbers associated with the Mongoose host device, and the routing of audio to and from the Mongoose CobraNet Bundles. If you want to view and manage other CobraNet settings not included in the Mongoose Tracker, you can do so using an SNMP MIB browser or the CobraNet Disco software. Note that to use SNMP, you must configure an IP address for CobraNet. You can do this from within CobraNet Disco.

6. **Will you include a backup CobraNet system in your design?**
   If you plan to include a redundant CobraNet system in your design to handle failover situations, you're in luck. Mongoose makes this easy for you. The Mongoose hardware contains two CobraNet ports, one for your primary network and one for your secondary network. Connect the secondary port to your backup system and, voila, you're good to go. If the primary network fails, the secondary network automatically becomes active.

Latency Awareness



Example Applications

This section includes several example audio designs utilizing the Mongoose system. Each example includes a generic one-line audio design, a detailed floor plan incorporating the Mongoose technology, and a shop drawing (similar to the one-line drawing but with Mongoose equipment specified). Each example also includes a link to its corresponding Mongoose Tracker configuration file (on the Rane website). You must use the Mongoose Tracker application to open and view these configuration files.

We'll begin with the simplest design – a tie-line.

RAD to RAD Using a Single Mongoose (Tie-Line)

This example involves the Saint Dawkins Church, which has a congregation of about 2000 people. The main sanctuary of the church holds 1300 people, so there is occasionally an overflow problem. It happens rarely, however, so the church board has decided against the expensive proposition of enlarging the sanctuary. Instead, they want to use the large meeting room in the church school building across the street to house overflow congregation members. They plan to install a projection system that will transmit the audio from the sanctuary to this meeting room.

Mongoose technology is perfect for this situation. Since the meeting room is across the street from the church (and the source of the audio signal), installing analog cables could prove problematic. Even with the addition of isolation transformers, there is absolutely no guarantee that the sound quality will be suitable. The church board would definitely be hearing a few complaints from members who had to sit in a room across the street and couldn't understand a thing that was said! The digital signal provided by the Mongoose system solves this issue completely, delivering clear sound to the poor folks who slept too late to get a church seat. Also, because it's a simple tie-line system, the Mongoose provides the connection without requiring a CobraNet network. The signal travels directly from an input RAD to the Mongoose to an output RAD in the overflow room.

Following is the one-line drawing for this audio system:

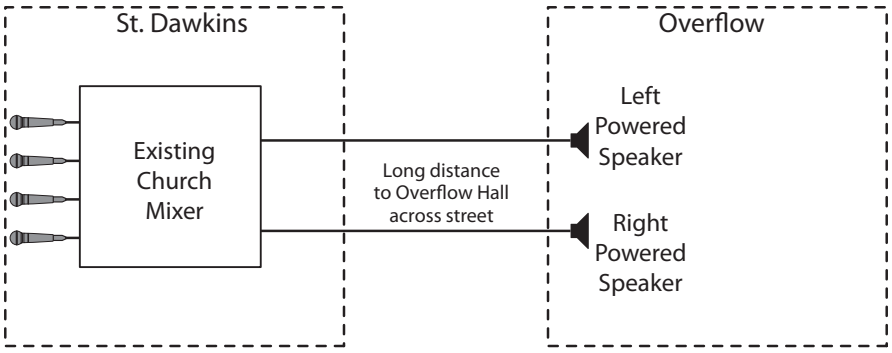


Figure 25: One-line drawing for Saint Dawkins Church tie-line application

Following is a floor plan of the system:

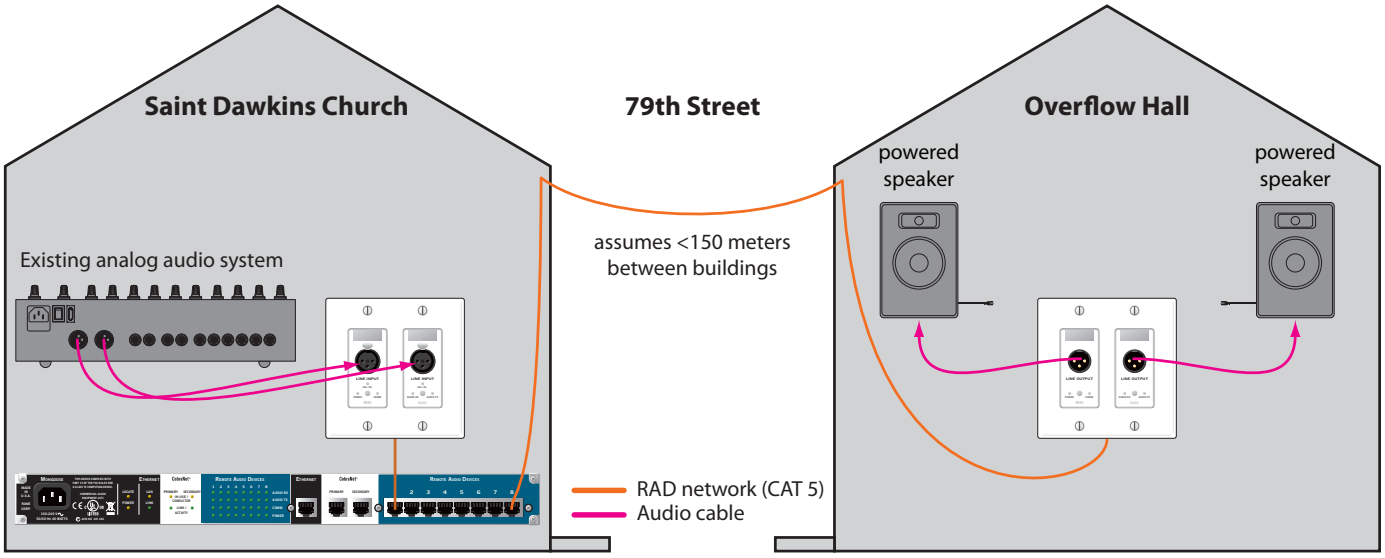


Figure 26: Floor plan of Saint Dawkins Church tie-line application

Note: In the above situation, you may be tempted to place another Mongoose in the overflow hall and use a wireless network to connect them. Wireless CobraNet communication is currently not supported, however, so this solution is not possible.

Here is the corresponding shop drawing:

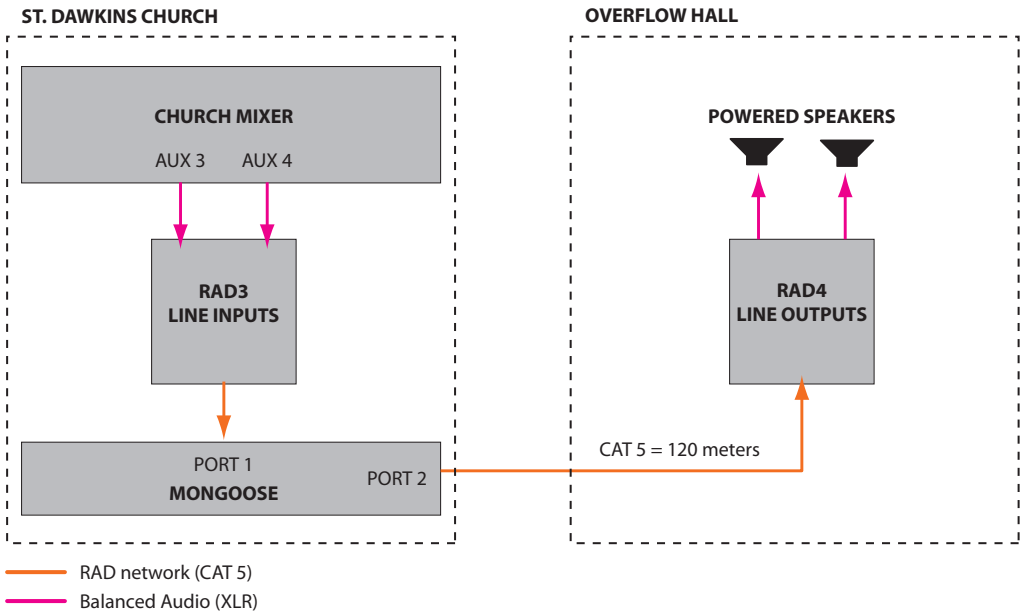


Figure 27: Shop drawing for Saint Dawkins Church tie-line application

The Mongoose configuration file for this example application can be downloaded here: saint_dawkins.mgs. Following is a screen shot of the configuration's main window, including the routing matrix:

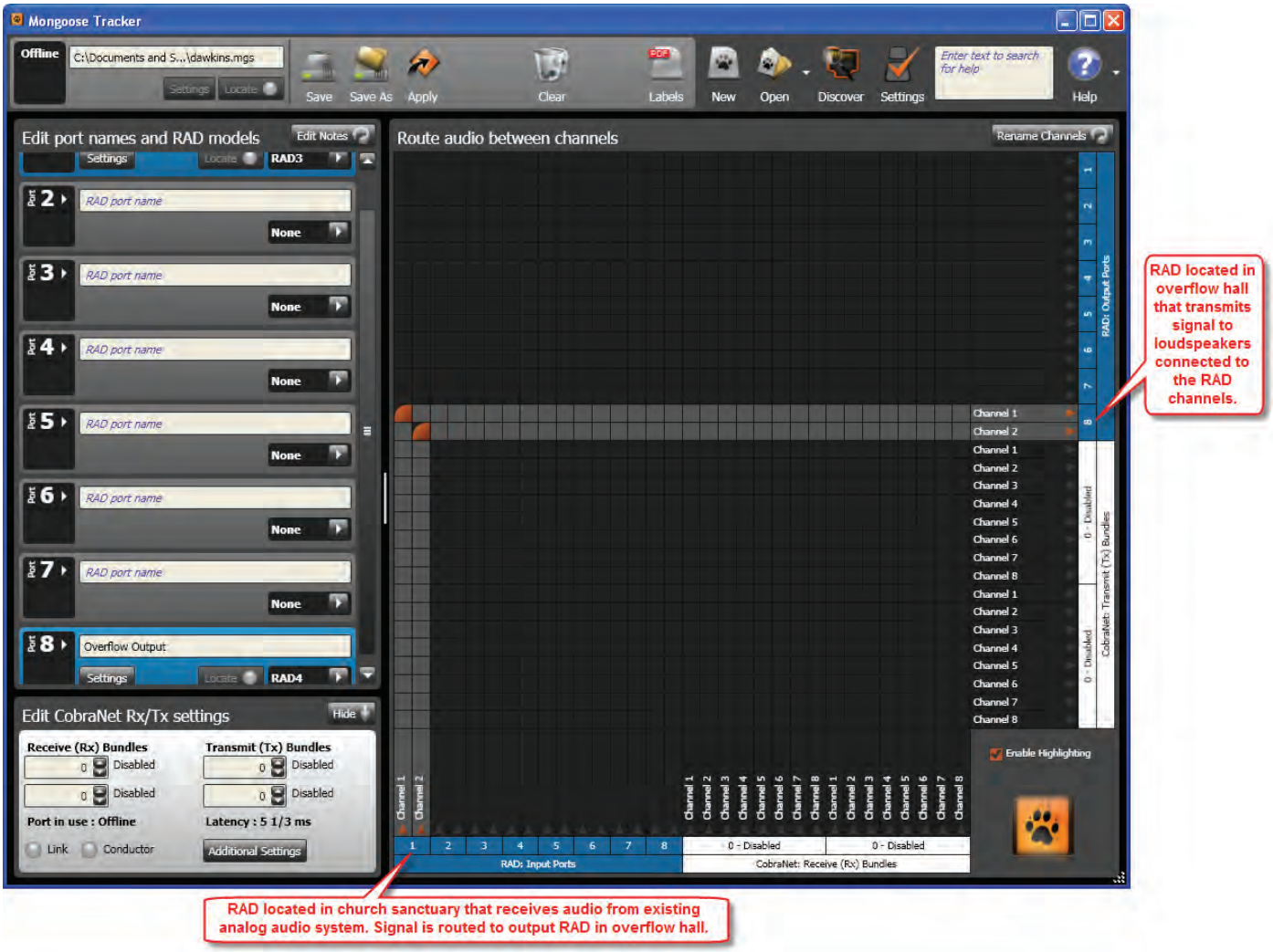


Figure 28: Configuration for Saint Dawkins Church tie-line application

RAD to DSP (or other device) via CobraNet using a Single Mongoose

Since we can safely assume that you've been inside an elementary school at some point in your life, we can also assume that you are familiar with those funny room combinations called "cafetoriums" – a lunch room and auditorium rolled into one. The following sample application illustrates a possible Mongoose system that would serve such a space.

This cafetorium is used for school plays and other performances and functions. Audio requirements are:

- Four microphones are needed on the stage.
- Two powered speakers will be mounted high on the wall on either side of the stage.
- The school also wants the capability to make announcements from the opposite side of the room and to play background music (during lunch or prior to the beginning of a performance). They want to control this music from the back of the room, not from the stage area.

In this example, the Mongoose is a wise choice because it provides the school with tremendous flexibility and extensibility. While delivering superb sound quality in the cafetorium, it also ties in with the existing school paging system, and provides the possibility of additional functionality in the future (as new RADs are introduced).

Following is the one-line drawing for this audio system:

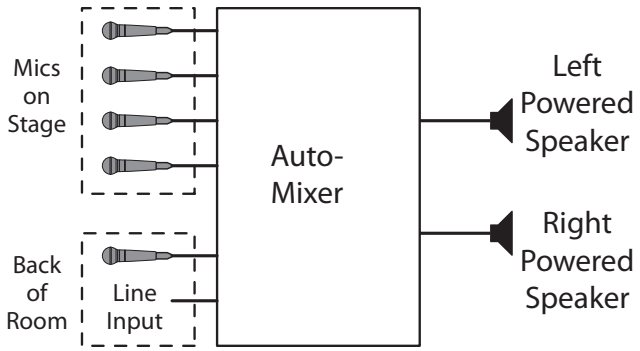


Figure 29: One-line drawing for cafetorium example application

Following is the floor plan for the system:

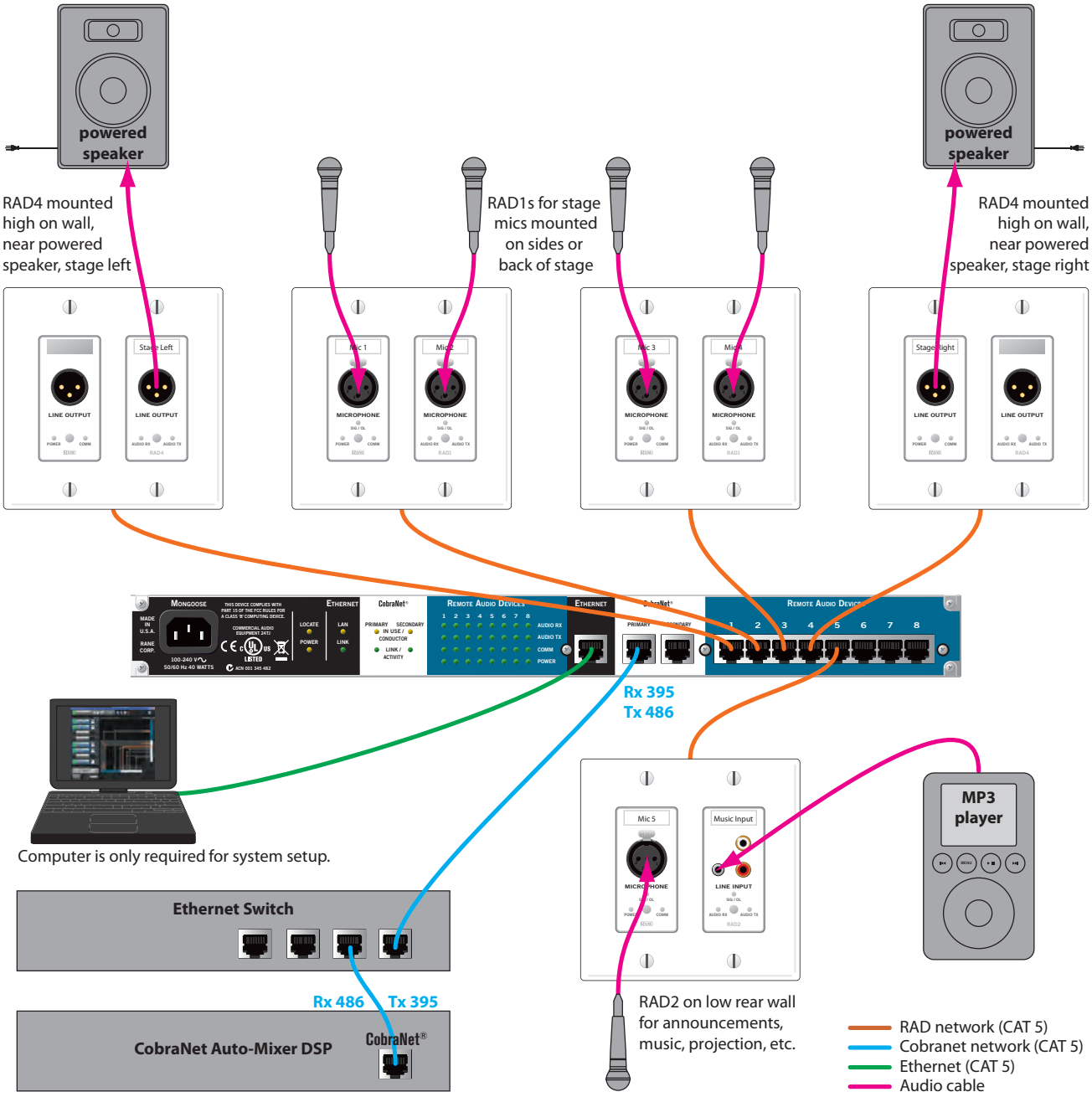

powered speaker
RAD4 mounted high on wall, near powered speaker, stage left
RAD1s for stage mics mounted on sides or back of stage
powered speaker
RAD4 mounted high on wall, near powered speaker, stage right
Rx 395
Tx 486
Computer is only required for system setup.
Ethernet Switch
Rx 486
Tx 395
CobraNet Auto-Mixer DSP
RAD2 on low rear wall for announcements, music, projection, etc.
MP3 player
RAD network (CAT 5)
Cobranet network (CAT 5)
Ethernet (CAT 5)
Audio cable

Figure 30: Floor plan of cafetorium example application (illustrating RAD to DSP routing)

- Two RAD1s are installed on the front of the stage. These accommodate the 4 required mics.
- Two RAD4s are installed high on the wall near the speakers. Two to four powered speakers could be plugged into these RADs.
- One RAD2 is installed to satisfy the requirement for a microphone and line input (for playing background music) at the back of the room,
- This application contains a total of five RADs, therefore only one Mongoose is needed. The Mongoose is housed in a sound equipment room along with a network switch and a CobraNet DSP box that contains a microphone auto-mixer.

Here is the corresponding shop drawing:

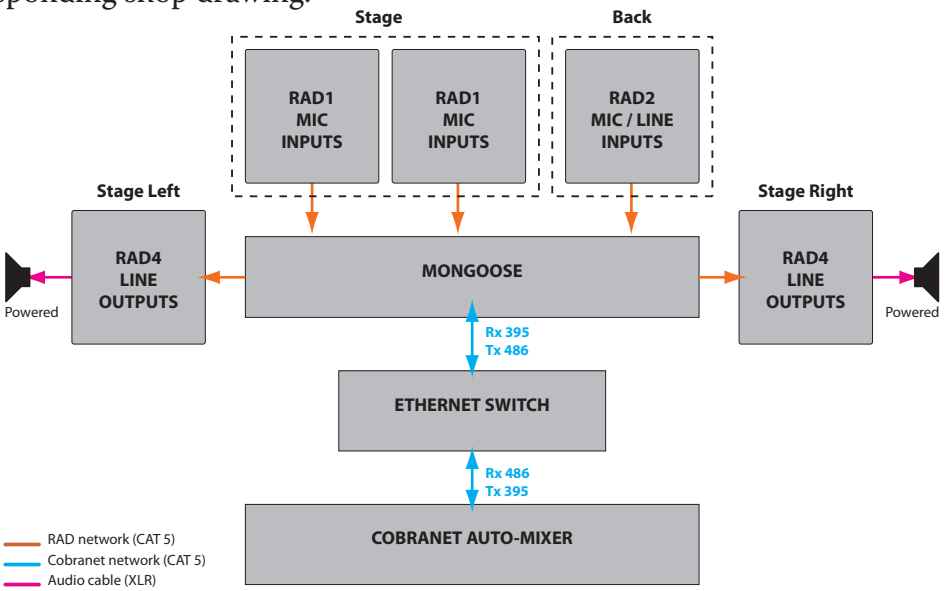


Figure 31: Shop drawing for cafetorium example application (illustrating RAD to DSP routing)

The Mongoose configuration file for this example application can be downloaded here: cafetorium.mgs. Following is a screen shot of the configuration's main window, including the routing matrix:

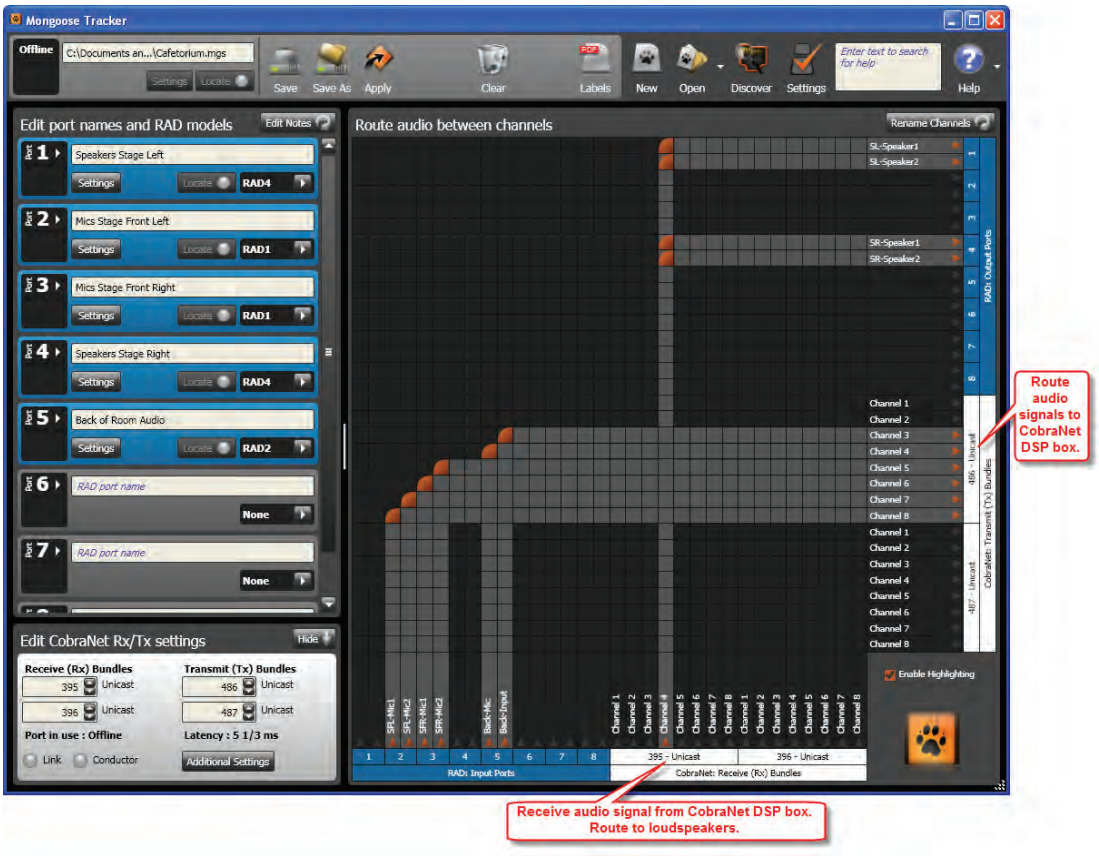

Mongoose Tracker
Edit port names and RAD models
Route audio between channels
Speakers Stage Left
Mics Stage Front Left
Mics Stage Front Right
Speakers Stage Right
Back of Room Audio
Edit CobraNet Rx/Tx settings
Route audio signals to CobraNet DSP box.
Receive audio signal from CobraNet DSP box. Route to loudspeakers.

Figure 32: Configuration for Cafetorium example application (routing RADs from a single Mongoose to and from a CobraNet device)

RAD to DSP (or other device) using Multiple Mongoose Devices

The following sample application is a bit more complex. It is a hotel that contains several meeting rooms, a ballroom, and a restaurant/bar. It is a prime target for the Mongoose because of the low channel count in each room and the scattered locations of each audio input and output. This system requires more than eight RADs and, therefore, requires more than one Mongoose. The specific requirements are as follows:

Meerkat Room (used for meetings, conference sessions, roundtable discussions)

- Six microphones on one side of the room
- Four powered speakers high on the wall – on the sides and in the back of the room

Cusimance Room (used mostly for presentations)

- Two microphones – one in the northwest corner and one in the southeast corner
- Amplification of audio from a computer. This computer could be located in the northwest corner or in the southeast corner of the room.
- Two to four powered speakers mounted high on the wall – in the southwest and northeast corners of the room

Atilax Ballroom (used for roundtable discussions, presentations, music performances)

- Seven microphones to be placed on the west, north, and/or south sides of the room
- Amplification of audio from a computer, DVD player, or similar device
- Four powered speakers on the north, south, and east sides of the room.

Hotel Restaurant that also contains a bar

Carnivore Cantina (the restaurant)

- Connection for a satellite music service to the hotel's central audio system
- Connection for a CD jukebox to the hotel's central audio system

Botswana Bar

- Connection for cable TV to the hotel's central audio system
- Connection for a TV with DVD player to hotel's central audio system

Following is the one-line drawing for this audio system:

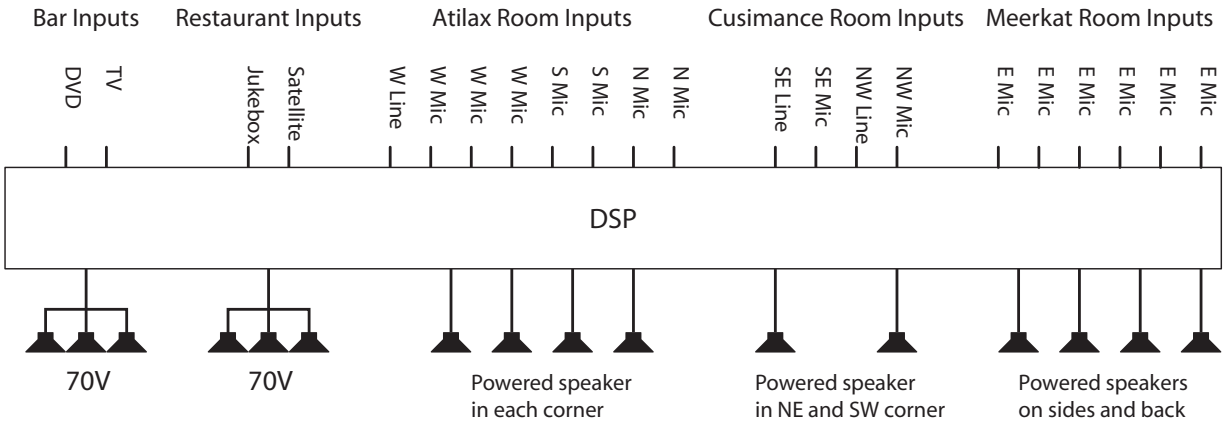


Figure 33: One-line drawing for hotel example application

Meerkat Room

- One RAD3 to accommodate a microphone mixer.
- One RAD1 to accommodate two individual microphones.
- Two RAD4s to accommodate two to four powered speakers.

Cusimance Room

- Two RAD2s, each of which accommodates a microphone and a line input (for computer audio, DVD player, etc.).
- Two RAD4s to accommodate two to four powered speakers.

Atilax Ballroom

- Three RAD1s to accommodate six microphones.
- One RAD2 to accommodate one microphone and one line input.
- Two RAD4s to accommodate two to four powered speakers.

Rack Room

- Because there are 16 RADs in this system, two Mongoose devices are required. As you can see from the illustration, the eight RADs located in the Meerkat and Cusimance rooms are connected to one Mongoose while the eight RADs located in the Atilax Ballroom and the restaurant/bar are connected to the other Mongoose. Each Mongoose is connected via CobraNet to a single DSP device.

Carnivore Cantina

- One RAD3 to accommodate a CD jukebox and a satellite music service.

Botswana Bar

- One RAD3 to accommodate cable television and a television with DVD player.

Following is the floor plan of the system:

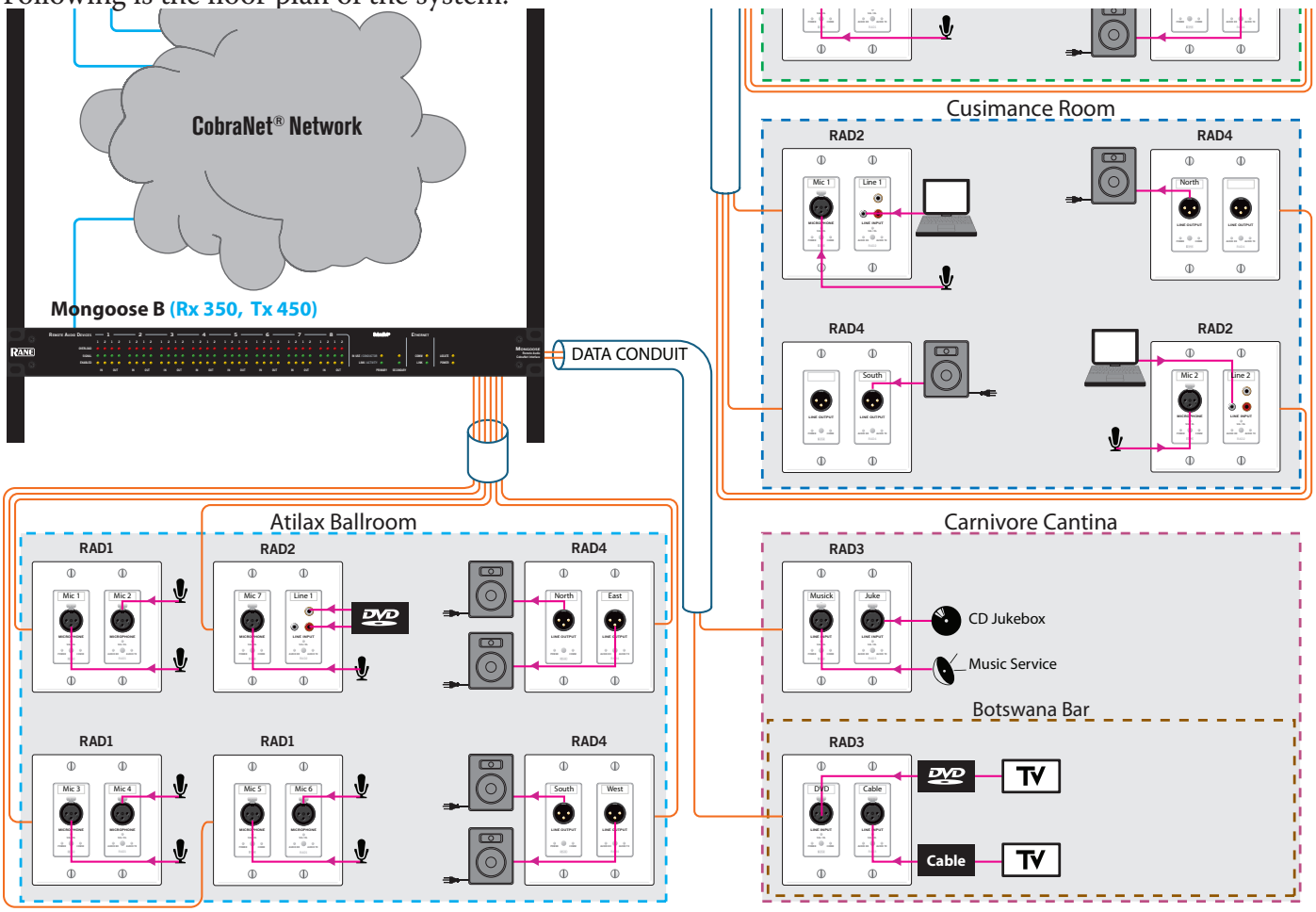


Figure 34: Floor plan of hotel application illustrating routing of RADs from multiple Mongoose devices to DSP equipment

Here is the corresponding shop drawing:

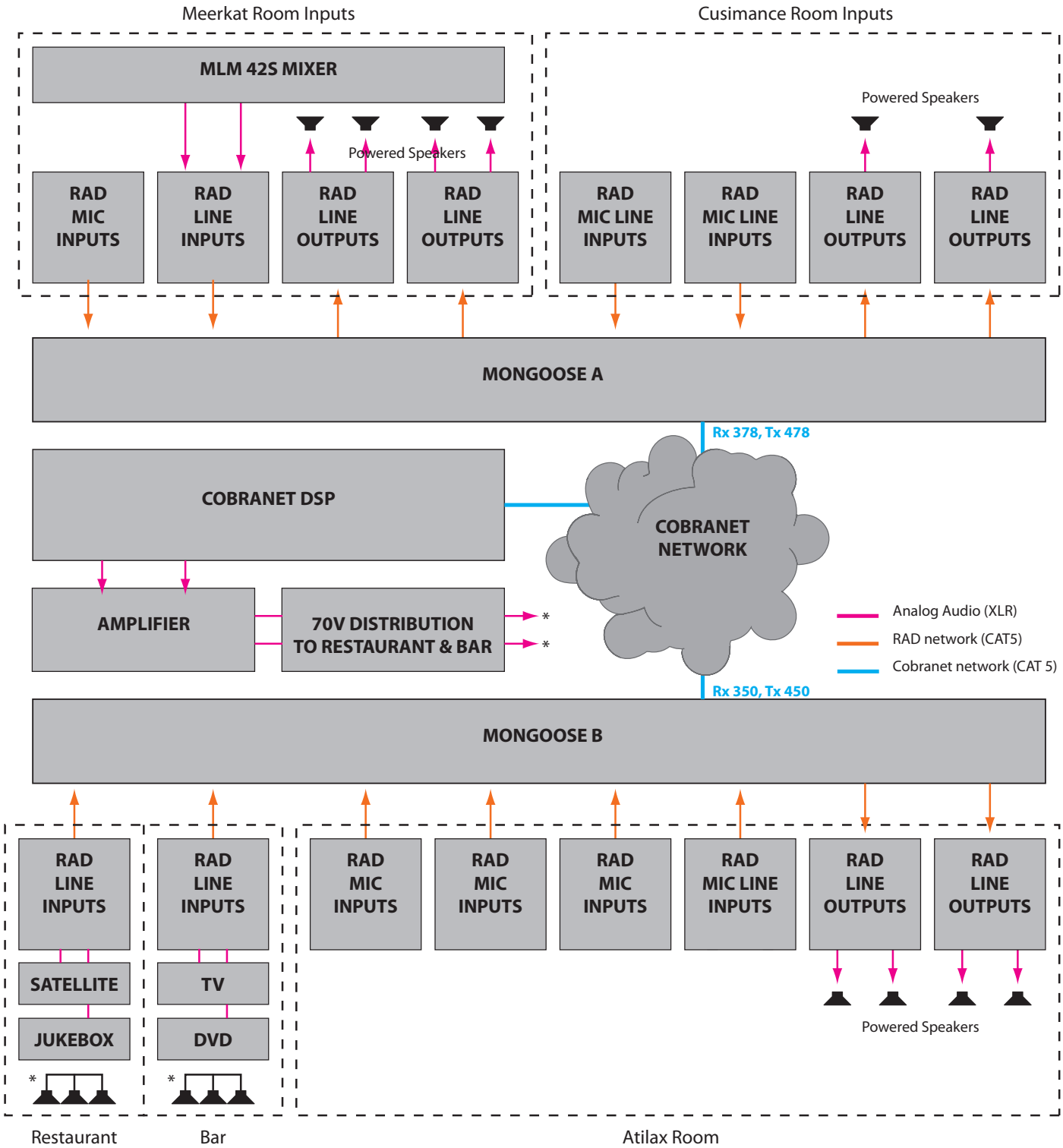


Figure 35: Shop drawing of hotel application illustrating routing of RADs from multiple Mongoose devices to DSP equipment

This example uses two Mongoose devices and, therefore, requires two configuration files. The files can be downloaded here: atilax_hotel_a.mgs and atilax_hotel_b.mgs. Following is a screen shot of the configuration's main window for each configuration file, including the routing matrix:

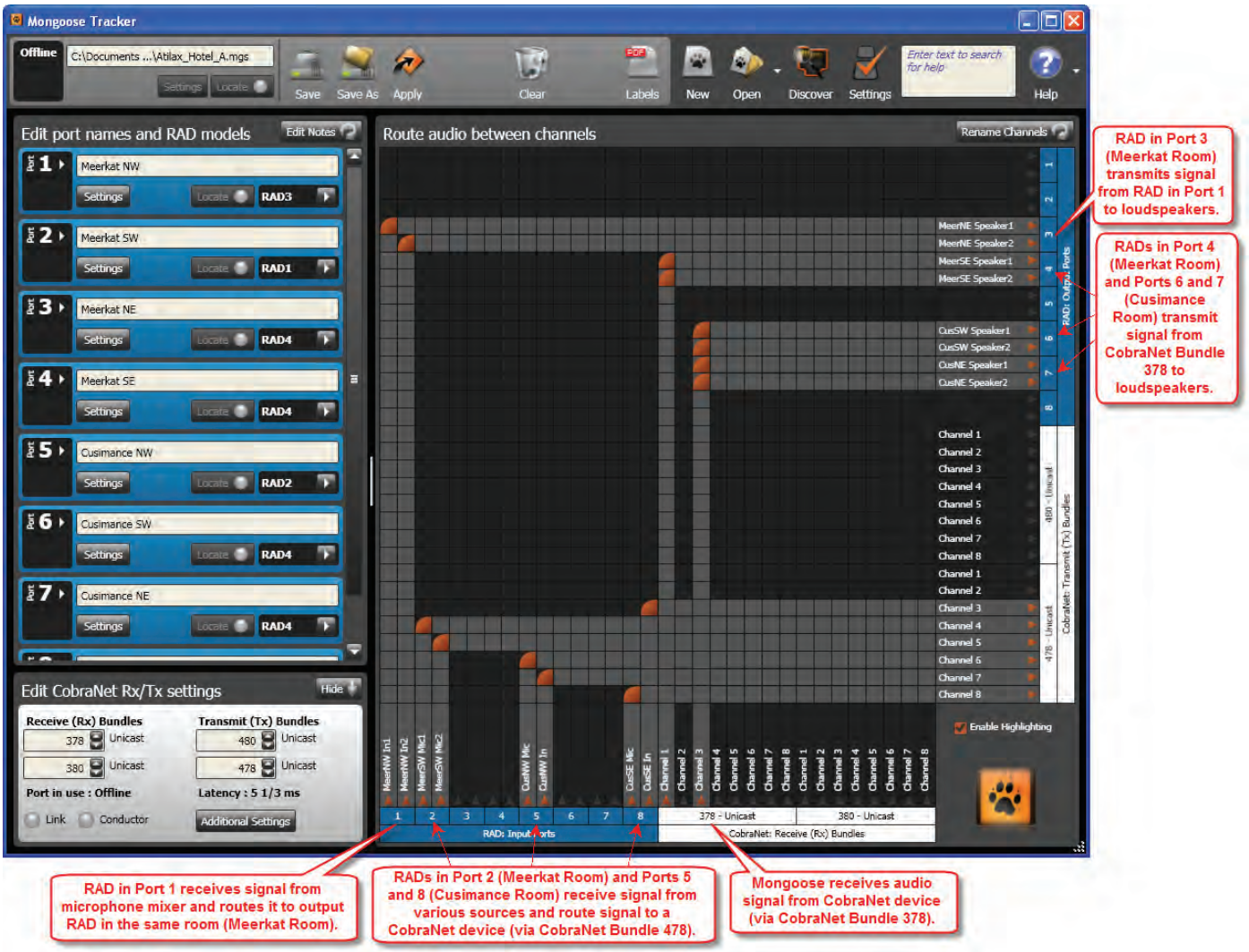


Figure 36: Configuration for Mongoose A in Atilax Hotel example application (routing RADs from multiple Mongoose devices to and from one or more CobraNet devices)

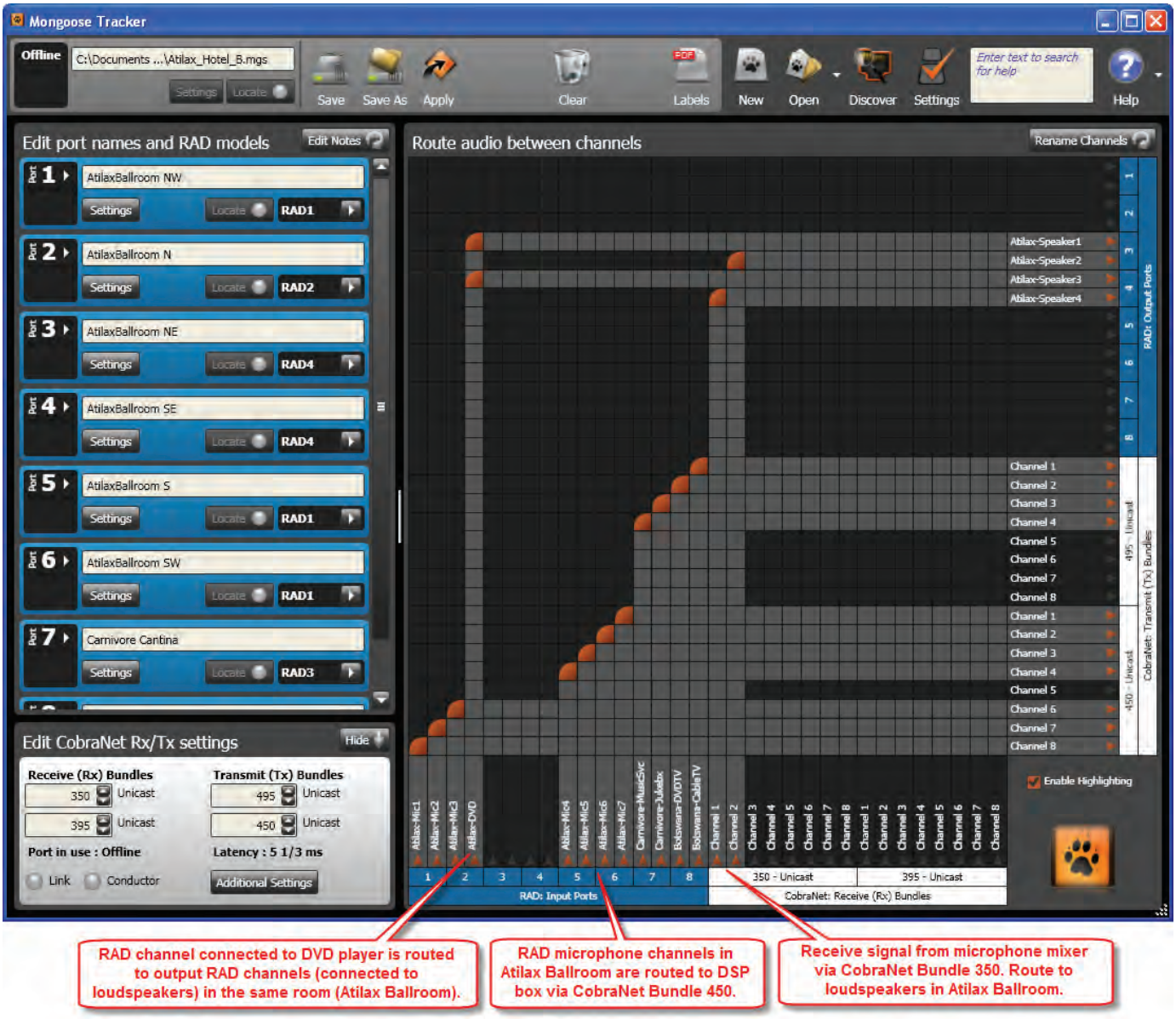


Figure 37: Configuration for Mongoose B in Atilax Hotel example application (routing RADs from multiple Mongoose devices to and from one or more CobraNet devices)

CobraNet Bundle to CobraNet Bundle

The final example application illustrates the benefits of the Mongoose's ability to aggregate audio channels. In this example, we move to the campus of a small college – Kipling College. To help focus, we highlight a small portion of what would likely be a much larger audio system. The college has just built a new student union building (the Rudyard Student Union) and student cafeteria (the Rikki-Tikki-Tavi Cafeteria). They want an audio system that sends miscellaneous music and television signals to various zones within each building as well as a microphone paging system that serves both locations. The specific requirements are:

Rudyard Student Union

- Two page microphones.
- Nine audio zones.
- Receipt of signal from music and television sources provided to the college.

Rikki-Tikki-Tavi Cafeteria

- Two page microphones.
- Four audio zones.
- Receipt of signal from music and television sources provided to the college.

Rack Room

- DSP box(es) that handle microphone mixing, zone processing, and receipt of music and television signals.

Following is the one-line drawing for this audio system:

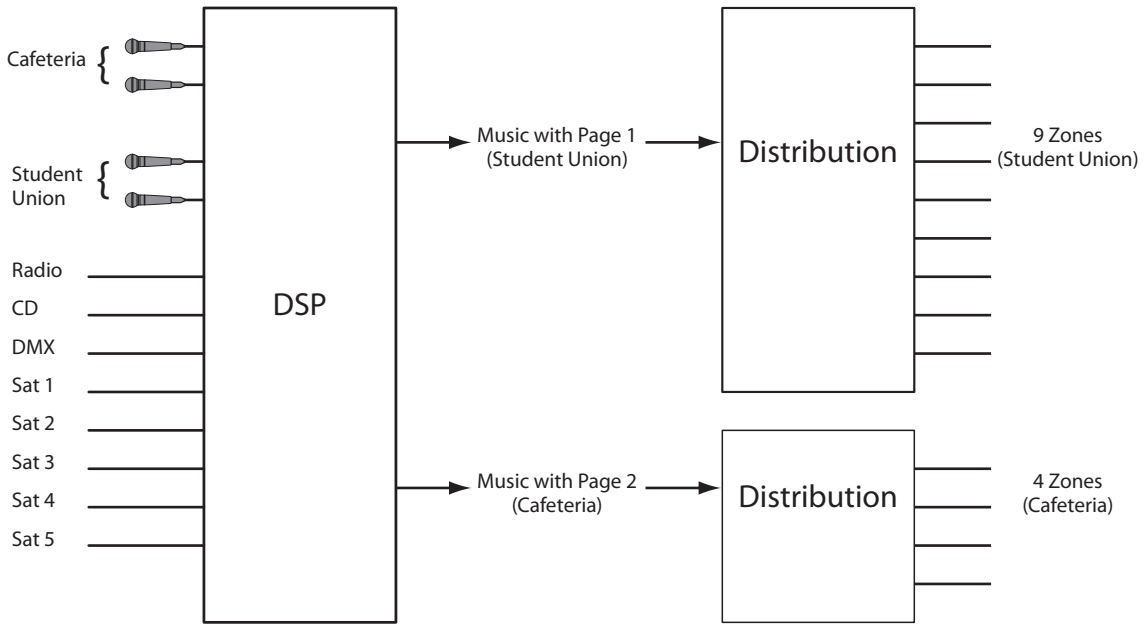


Figure 38: One-line drawing for Kipling College music and paging system

To handle these requirements, the contractor decides to use two DSP boxes – one handles the eight incoming music and television signals while the other handles the microphone mixing and zone processing. Inputs to the zone processing/microphone mixing DSP box are limited to two CobraNet Bundles. One of these Bundles is used for receipt of the music/television channels. This leaves only one Bundle for receipt of the microphone signals from both the student union and the cafeteria. Without the Mongoose, this would be impossible and an additional DSP box would need to be purchased. Using Mongoose technology, however, you can combine the microphone signals from disparate locations into a single CobraNet Bundle, eliminating the need for that additional DSP box. The floor plan drawing illustrates how this is done:

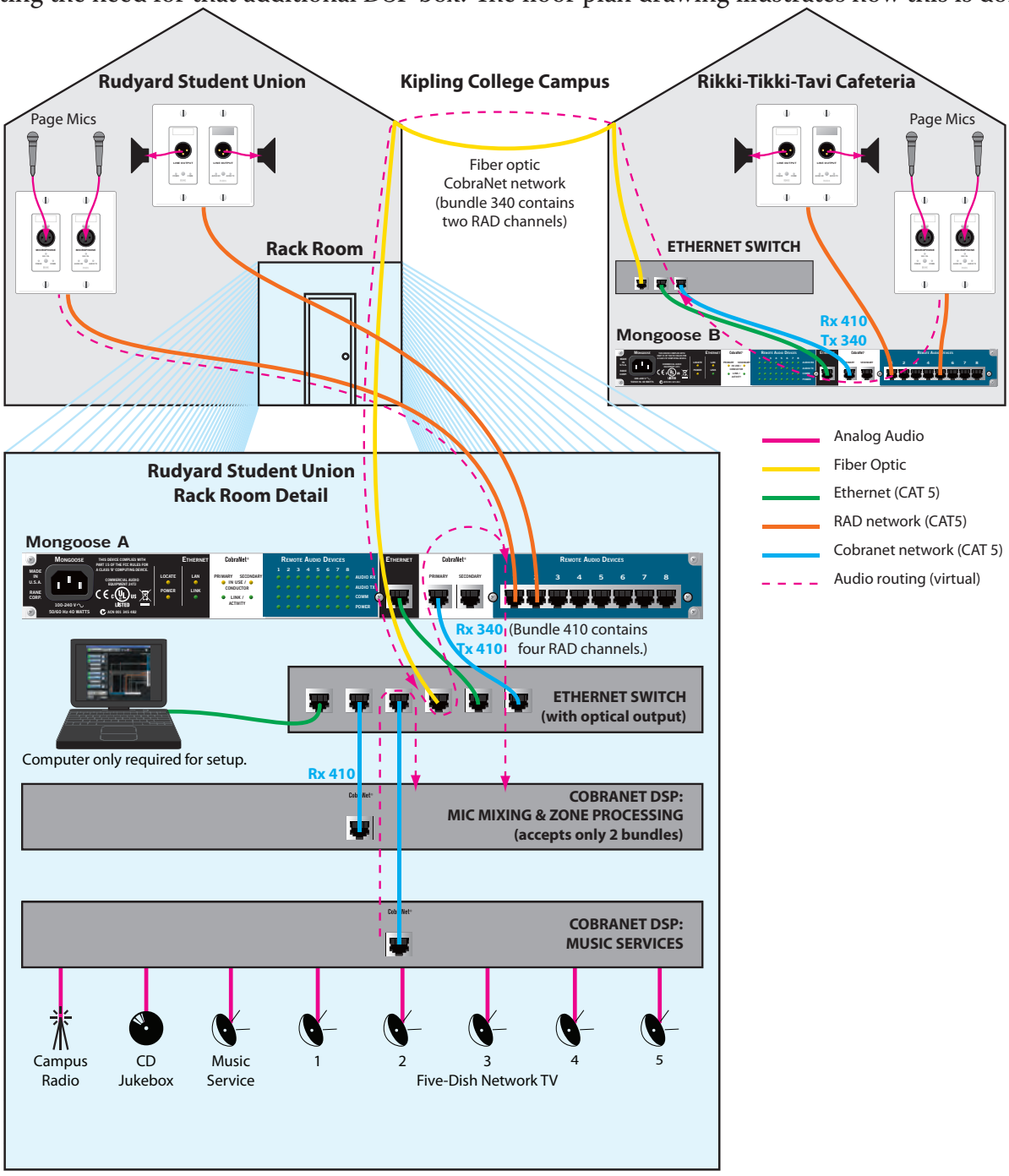


Figure 39: Floor plan for Kipling College music and paging system - illustrating Bundle aggregation

Here is the corresponding shop drawing:

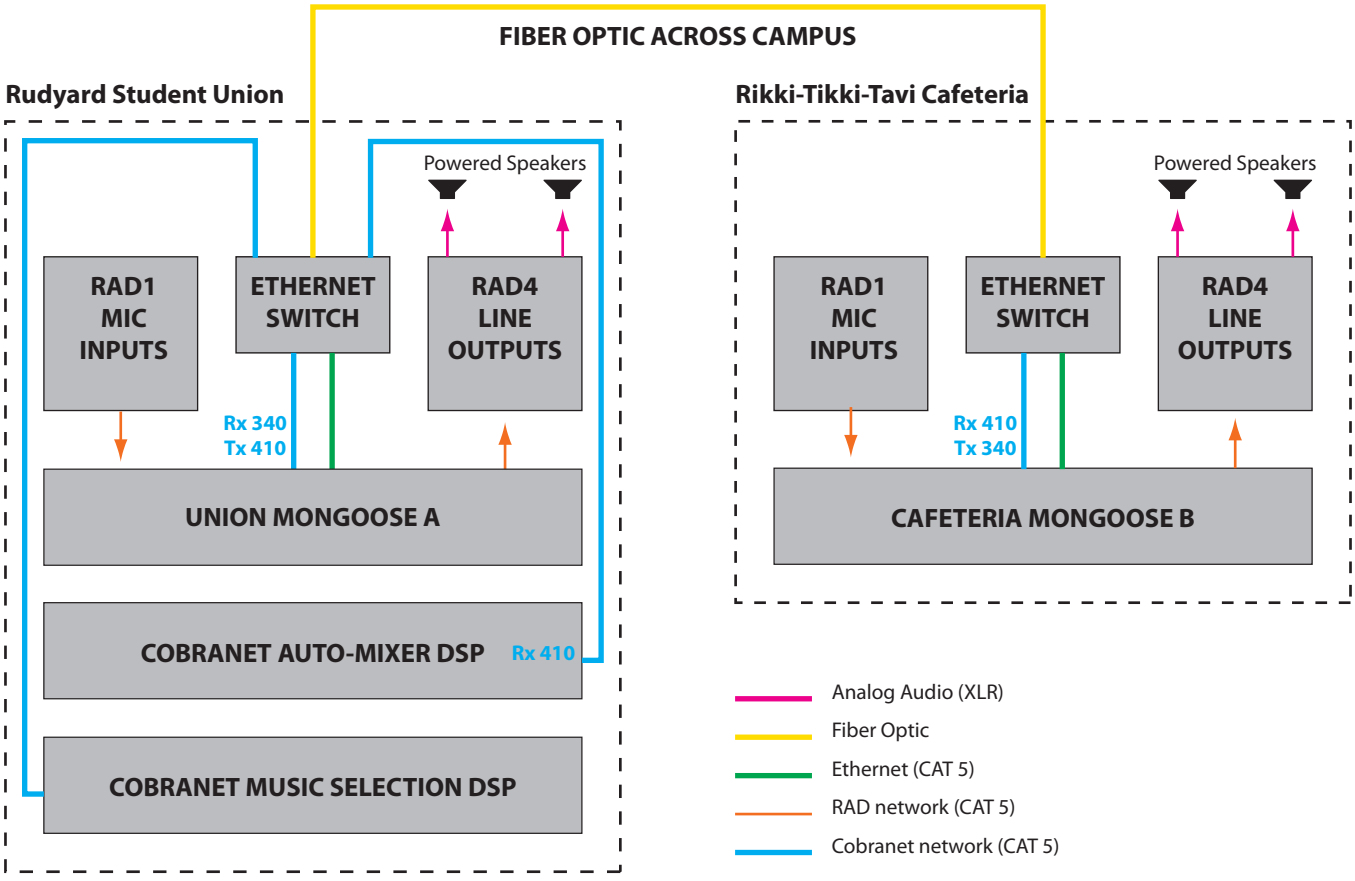


Figure 40: Shop drawing for Kipling College example application – illustrating Bundle aggregation

This example uses two Mongoose devices and, therefore, requires two configuration files. The files may be downloaded here: rudyard.mgs and rikkitikitavi.mgs. Following on the next page is a screen shot of the configuration's main window for each configuration file, including the routing matrix:

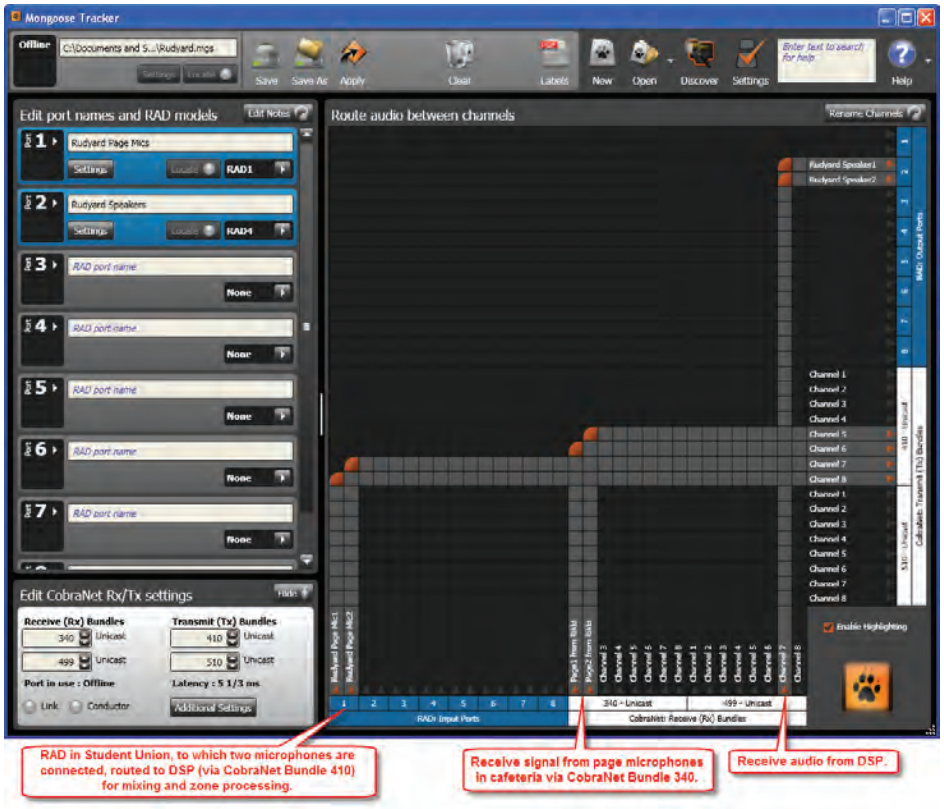

Mongoose Tracker
Edit port names and RAD models
Route audio between channels
Edit CobraNet Rx/Tx settings
RAD in Student Union, to which two microphones are connected, routed to DSP (via CobraNet Bundle 410) for mixing and zone processing.
Receive signal from page microphones in cafeteria via CobraNet Bundle 340.
Receive audio from DSP.

Figure 41: Configuration for Mongoose A in Rudyard Student Union of Kipling College

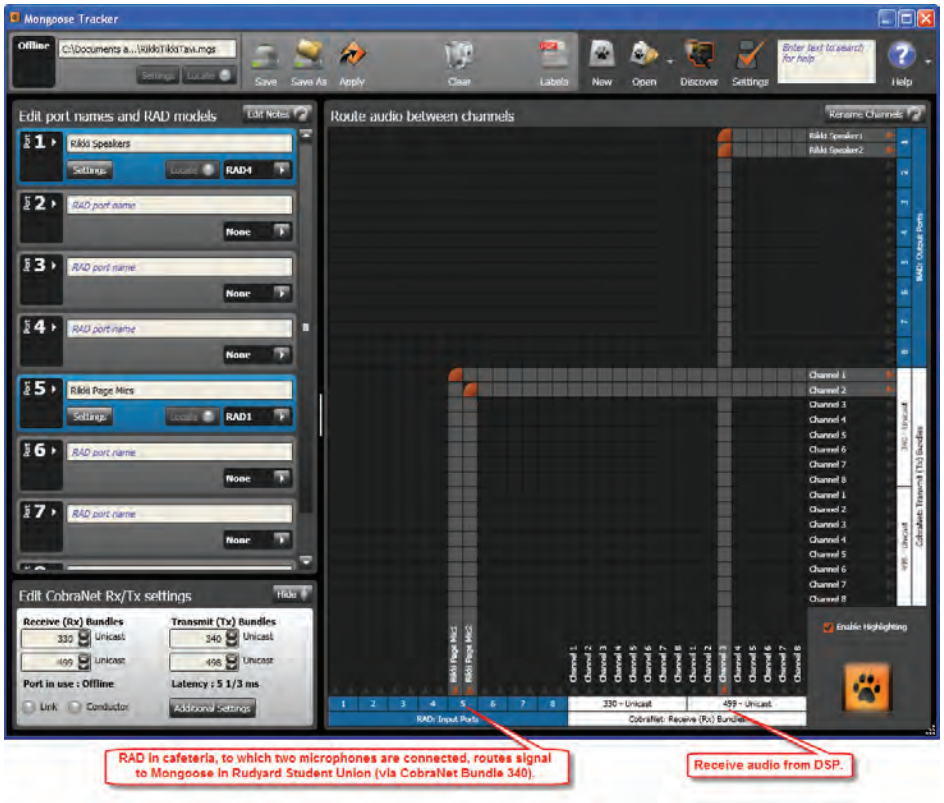

Mongoose Tracker
Edit port names and RAD models
Route audio between channels
Edit CobraNet Rx/Tx settings
RAD in cafeteria, to which two microphones are connected, routes signal to Mongoose in Rudyard Student Union (via CobraNet Bundle 340).
Receive audio from DSP.

Figure 42: Configuration for Mongoose B in Rikki-Tikki-Tavi Cafeteria of Kipling College

SECTION 4: INSTALLATION AND CONFIGURATION ISSUES

This section discusses general installation issues you may consider prior to handing your design over to the installer. The actual details of installing the product are covered in the *Mongoose Installation Guide*.

Key Installation Tasks and Recommended Work Flow

Presented below (in the recommended order) are the six primary tasks involved in installing a Mongoose system (once the initial system design is complete):

1. **Create the Mongoose configuration file.**
   As previously discussed, we recommend creating the initial configuration file during the design phase and provide this file to your installer. Although the Mongoose can be manually configured during the actual installation, it is preferable to make these configuration decisions ahead of time. The installer can then simply load the configuration file into the device during installation.

2. **Install and connect the Mongoose.**
   Physically install the Mongoose into the audio rack (either on- or off-site) and then connect the Mongoose – to the Ethernet network, to the CobraNet network, or to another CobraNet device.

3. **Load the configuration file into the Mongoose.**
   This and the next task (installation of the RADs) are interchangeable. There are advantages, however, to loading the configuration file first. If the Mongoose is powered on and configured prior to installing the RADs, you can determine immediately upon installing a RAD if it is functioning properly or if there is a mismatch between the RAD model installed and the RAD model specified in the Mongoose configuration file.

4. **Install and connect the individual RADs.**
   Although not listed as a separate task, the CAT 5 cable should be pulled prior to installing the RADs. As stated above, we also recommend that you connect, power on, and configure the Mongoose before installing the RADs.
   Note:
   - If you plan to label the RADs (always a good idea), this is the point of the process in which the installer needs to attach the labels (unless they were attached during an off-site build of the audio rack). We recommend that you create these labels during the design process and provide them to the installer with appropriate instructions. See "Generating RAD Labels" on page 58.

   - You may want to point out to your installer various ways to work with the RAD device to make it flush with the wall and parallel with the floor. The RAD screws are in a slot, allowing you to rotate the RAD if necessary when installing it into a switchbox that is crooked. You can also bend or snap off the Mickey Mouse-like metal circles above and below each input and output. Bending these circles can help make the RAD flush with the wall in situations where the switchbox is not flush. When snapped off (using needle-nose pliers), these circles can be used as washers behind the screws.

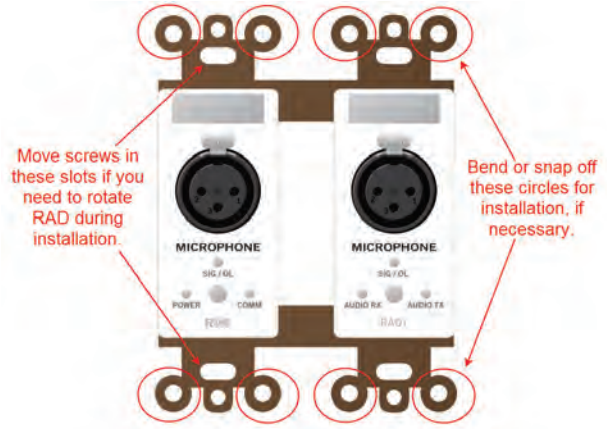

Move screws in these slots if you need to rotate RAD during installation.
Bend or snap off these circles for installation, if necessary.
MICROPHONE
MICROPHONE

Figure 43: Adjusting RAD to make it flush with wall

5. **Perform an audio test.**
   Verify the system is performing as it should. (Monitor the **Signal** and **Overload** LEDs as an indicator that the RADs are successfully receiving the audio signal. Troubleshoot any problems. If there is a problem, one of the first things to examine is the device's audio routing matrix (in the Mongoose Tracker). The *Mongoose Installation Manual* includes detailed troubleshooting tips.

6. **Save the final configuration file.**
   When the system is deemed to be A-OK, be sure to save the final version of the configuration file. Although all the configuration settings are saved in the Mongoose itself, it's important to keep a copy of those settings by saving them to a file. Having the file on hand makes it possible to return the device to a known state should you accidentally change any of its settings at a later time.

Installation Best Practices

1. When installing the equipment on-site, it is best to install the CAT 5 wiring first, then install, connect, and power on the Mongoose, and then install the RADs. Done in this order, you can verify that the RADs are working properly as soon as you connect them. If you also configure the Mongoose prior to installing the RADs, you can verify upon installation of the RAD if its model matches the model configured for this port on the Mongoose.
2. If your installation requires multiple Mongoose devices, we recommend configuring one device at a time. This simplifies the process and reduces the chance of making configuration errors. However, we do recommend connecting and naming all the devices at once (using the Locate functionality for verification). This helps ensure that the installer will provide a unique name for each device. See the *Mongoose Installation Manual* for details on this process.

Installing the Mongoose Off-site

If your installers will be building the audio rack off-site, there are just a few issues to consider:

- You can load the configuration file into the Mongoose while off-site.
- You obviously will not be installing RADs into walls when installing the rack off-site. However, if the RADs are available, we recommend connecting them and testing your configuration. You can use a standard Ethernet patch cable to connect them to the Mongoose.
- If you are able to test all the RADs off-site, you may want to label them. This helps ensure that when installed on-site, the RADs will be connected to the same ports they were connected when tested.

Connecting the Mongoose to a Network – Best Practices

As previously mentioned, the Mongoose connects to two types of networks – a control network and a CobraNet network. Both networks use Ethernet, but one sends and receives control data while the other sends and receives audio data. Each of these networks is described in detail below, along with recommendations for designing and implementing the networks.

Note: As a general rule, it is usually best to separate the control network and the CobraNet network. This is due to the different behaviors, needs, and requirements of the two networks.

About the Control Network

The control network is needed for configuring and managing the Mongoose. You use the Mongoose Ethernet port to connect the device to a computer running the Mongoose Tracker software. You can connect this port via CAT 5 to an Ethernet network switch, or you can use a standard Ethernet patch cable to connect the port directly to a computer. Because this port contains auto-MDIX functionality, you do not need to use a crossover cable – although it will also work.

Zero Configuration Networking

You probably know that when setting up networks, you typically need to configure IP addresses or enable dynamic assignment of IP addresses to the devices on the network. The Mongoose system is no exception. After all, the computer has to have some way of finding the Mongoose devices on the network. You'll be glad to know, however, that the engineers at Rane designed the Mongoose to greatly simplify this process. We are even willing to say that as long as all your control network connections are working properly, the Mongoose software will *magically* find all the Mongoose devices on the network – without any additional configuration. The Mongoose software uses a technology called Zero Configuration Networking (or Zeroconf), which is a set of techniques that automatically creates a usable IP network without configuration or special servers. **In other words, you won't need to mess with IP addresses when setting up your Mongoose control network.** Although rare, there may be a few exceptions to this. For example, if your control network needs to send data through a router or VPN, you may need to configure one or more static IP addresses. In such situations or in any large or complex network, we recommend working with the organization's IT department.

How Mongoose Tracker Communicates with the Mongoose

It is helpful to understand the basics of how Mongoose Tracker discovers and then communicates with a Mongoose device over the control network. Mongoose devices send occasional UDP (Zeroconf) messages. RaneLink (a Windows Service installed with Mongoose Tracker that helps establish communication with Mongoose devices) listens constantly for these messages and, once it receives one, does the following two things, if necessary: It sets up a temporary link-local IP address (in other words, it is cleared when the computer reboots) on the appropriate network interface card (NIC). It also adds an entry to the computer's network route table. This entry tells Windows and Mongoose Tracker which NIC to use for communicating with the Mongoose. The same UDP (Zeroconf) messages also indicate to Mongoose Tracker that a Mongoose device is available on the network, so it can be displayed in the Device Discovery window.

About the CobraNet Network

The CobraNet network is needed for transmission and reception of audio data between the Mongoose and other audio processing equipment. You use the CobraNet port to provide a network path for audio data to and from the Mongoose. There are two CobraNet ports on the back of the Mongoose – **Primary** and **Secondary**. Use the **Primary** port for your main CobraNet network. Use the **Secondary** port only if your system includes a backup CobraNet network. The **Secondary** port provides automatic redundancy should your primary network fail. Note that the CobraNet port does not contain auto-MDIX functionality, therefore you must use a crossover cable when connecting the Mongoose directly to another CobraNet device.

Note: Although you perform most of the management and configuration tasks for Mongoose via the control network, you can manage some aspects of CobraNet via the CobraNet network. This requires the use of an SNMP MIB browser or CobraNet Disco software.

Designing Each Network

The complexity of your design for both networks depends completely on your situation. This section provides an overview of some typical approaches as well as recommendations for which approach to take given certain circumstances. We highly recommend separating the control network and CobraNet network. Both networks offer similar design options, listed below. You can mix and match these options as you see fit.

1. *Direct connection, no network*

This approach is useful for very simple systems.

Control Network

This is the simplest approach for viewing and configuring the Mongoose. All you need to do is connect a computer directly to the Ethernet port on the device (using a standard Ethernet patch cable). You can only view and configure the device to which you're connected. If you have additional Mongoose devices to configure, you must connect your computer directly to each device, one at a time. This means you must be in close proximity to each Mongoose you want to view or configure. Another possible disadvantage is the lack of Internet access from the computer.

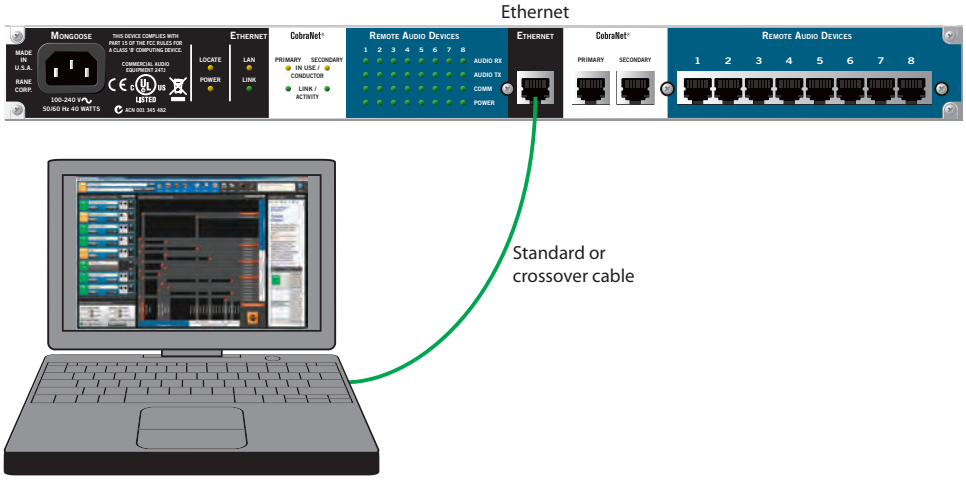


Figure 44: Control Network - direct connection

CobraNet Network

If you have only one piece of CobraNet equipment to connect to your Mongoose, you can connect it directly using a crossover cable. Simple, but limited to one piece of equipment.

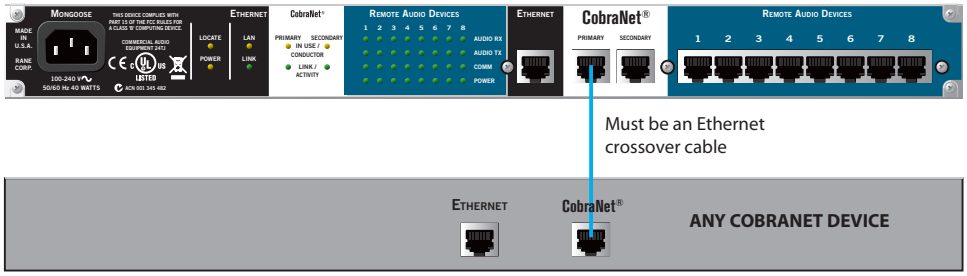


Figure 45: CobraNet Network - direct connection

2. *Isolated network for audio equipment*

This approach is often appropriate for small to mid-sized systems or for any size system that does not need to use an existing corporate network.

Control Network

If you need to manage multiple devices (multiple Mongoose devices and/or other Ethernet-controlled equipment), you may want to connect all the devices to an isolated network switch. By connecting your computer to the same switch, you can easily and quickly access each of the devices to perform management and configuration tasks. You could even include a wireless access point, which would allow computer access to the devices while roaming the building:

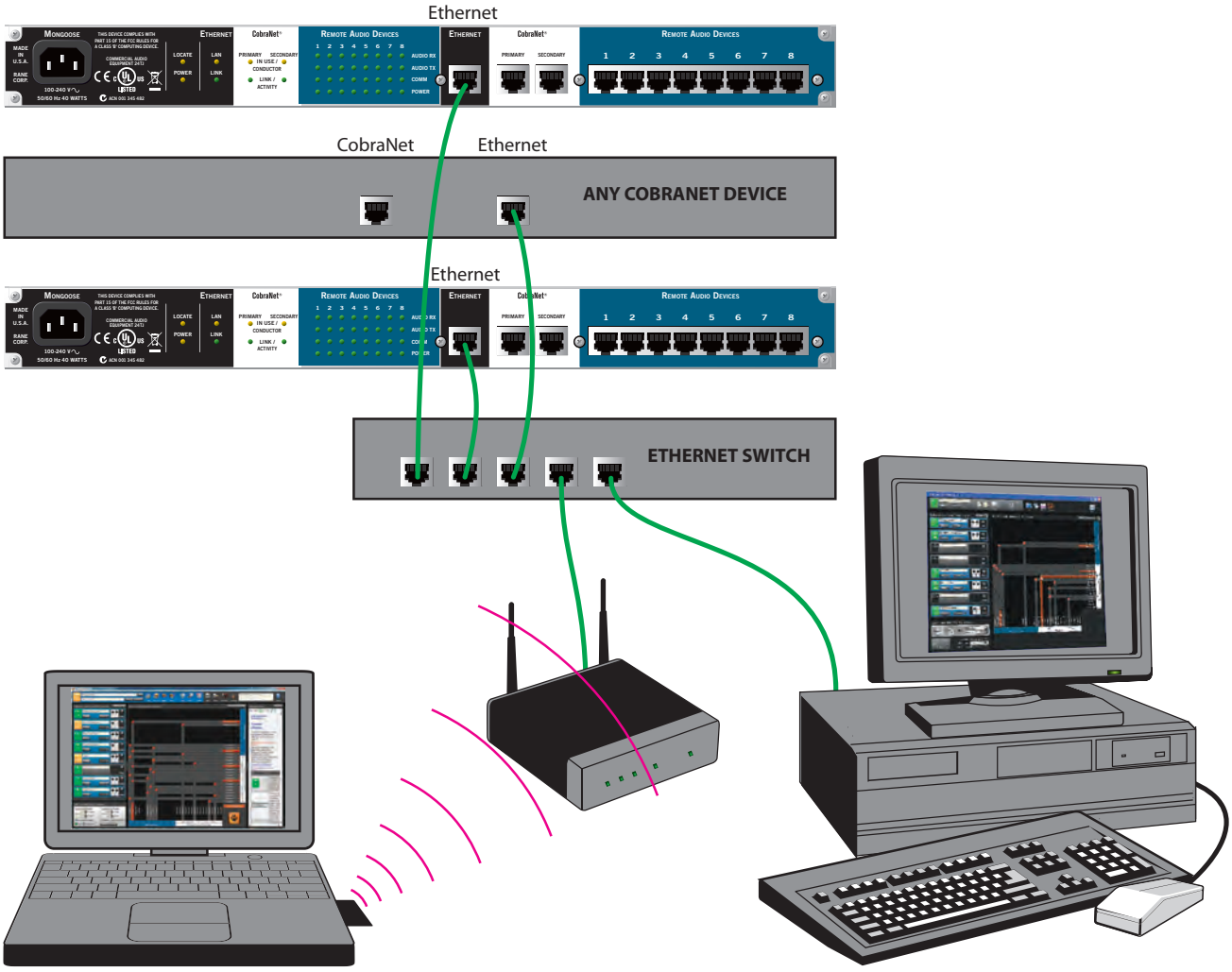


Figure 46: Control Network - isolated for audio network

CobraNet Network

If you are creating a new CobraNet network, you'll need to connect all your CobraNet devices to a network switch dedicated to the CobraNet network. If there is an existing CobraNet network, you will likely want to integrate the Mongoose system into it. To do so, just connect the Mongoose devices to the current CobraNet network switch. Advantages to this approach include the ability of the Mongoose system to send or receive audio from any other device in the network and the ability to centrally manage all your CobraNet devices (using SNMP or the Disco utility). Note that on the Mongoose devices, you can manage key CobraNet settings without needing SNMP or Disco.:

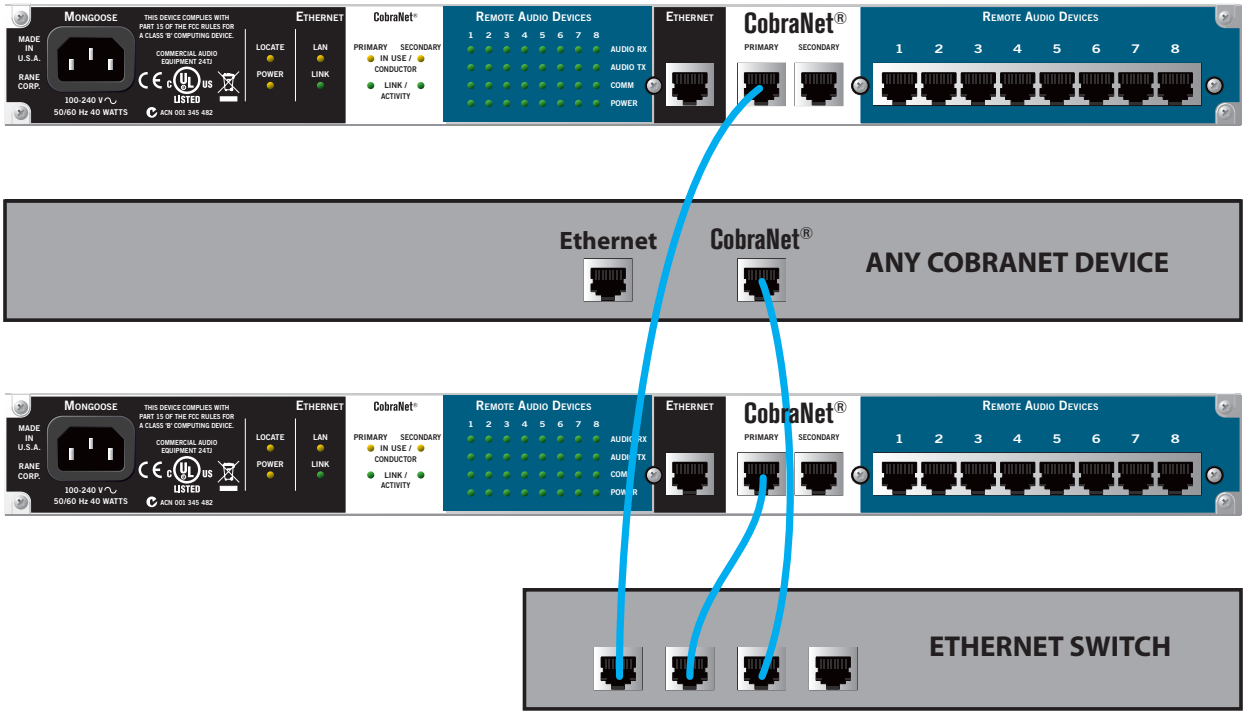


Figure 47: CobraNet Network - isolated for audio network

3. *Integrate control network with existing corporate data network*

If a corporate network is available, you may want to consider taking advantage of its infrastructure. This approach is for the control network only, as it is very rare that you would integrate your CobraNet network with the network that carries corporate data.

Control Network

Integrating the Mongoose or entire audio control network with an existing corporate data network requires a little extra work (mostly coordination with IT personnel), but its benefits are worthwhile. By connecting to the existing network, you gain tremendous flexibility in managing the host devices. It provides many of the same benefits of an isolated control network – the ability to access, view, and configure all the Mongoose devices from anywhere within the network. Depending on the available infrastructure, this may even include wireless access, which can be very handy when moving around a building checking the physical connection of the RADs and/or performing audio tests. In addition, this approach likely provides Internet access as well. Also, if the existing data network contains a VPN (Virtual Private Network), you can connect to the Mongoose system from a remote location. If you plan to integrate with an existing network, consult the organization's IT department.

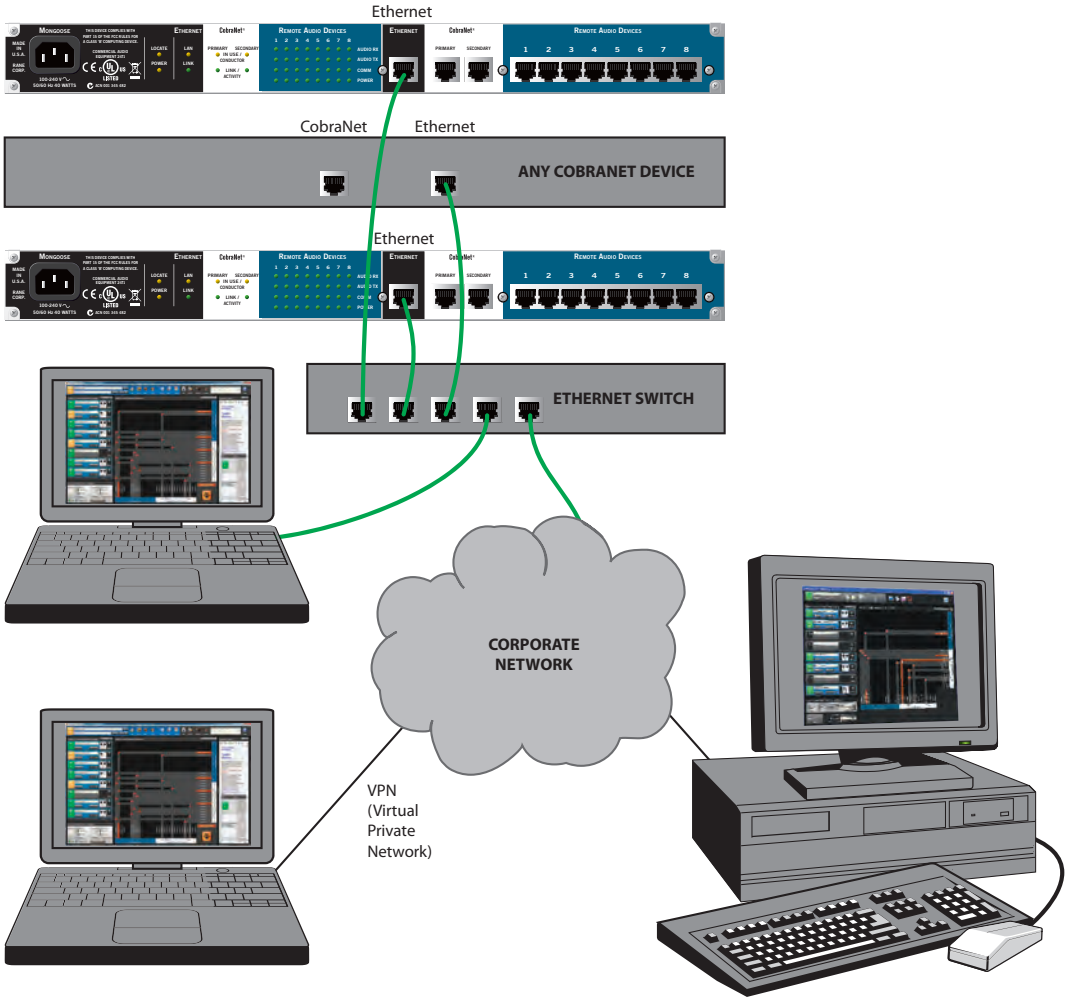


Figure 48: Control Network - integrated with existing corporate network

4. *Use existing network hardware, but isolate the CobraNet and/or control network*

As described in the previous section, there are many advantages to integrating the Mongoose control network with an existing network. Since the CobraNet and the control networks use Ethernet and are compatible, it is also possible to integrate the control network and the CobraNet network. Many IT departments, however, are justifiably hesitant to include CobraNet audio directly on their data networks because of the required bandwidth of CobraNet's beat packets and audio packets.

Because of the performance impact, we strongly discourage integrating the control data network directly with the CobraNet network. The primary advantage of combining everything on the same network is simplification. You can use the same network equipment and can perform both data and audio configuration and management within the same network. The primary disadvantage is the impact on network and device performance caused by the audio traffic.

If you are required to use the same network hardware for both the CobraNet and control networks, use a VLAN (Virtual Local Area Network). Using a VLAN, you can use the same physical hardware, but isolate parts of the network from one another. To use this approach, the network switch must support VLAN technology.

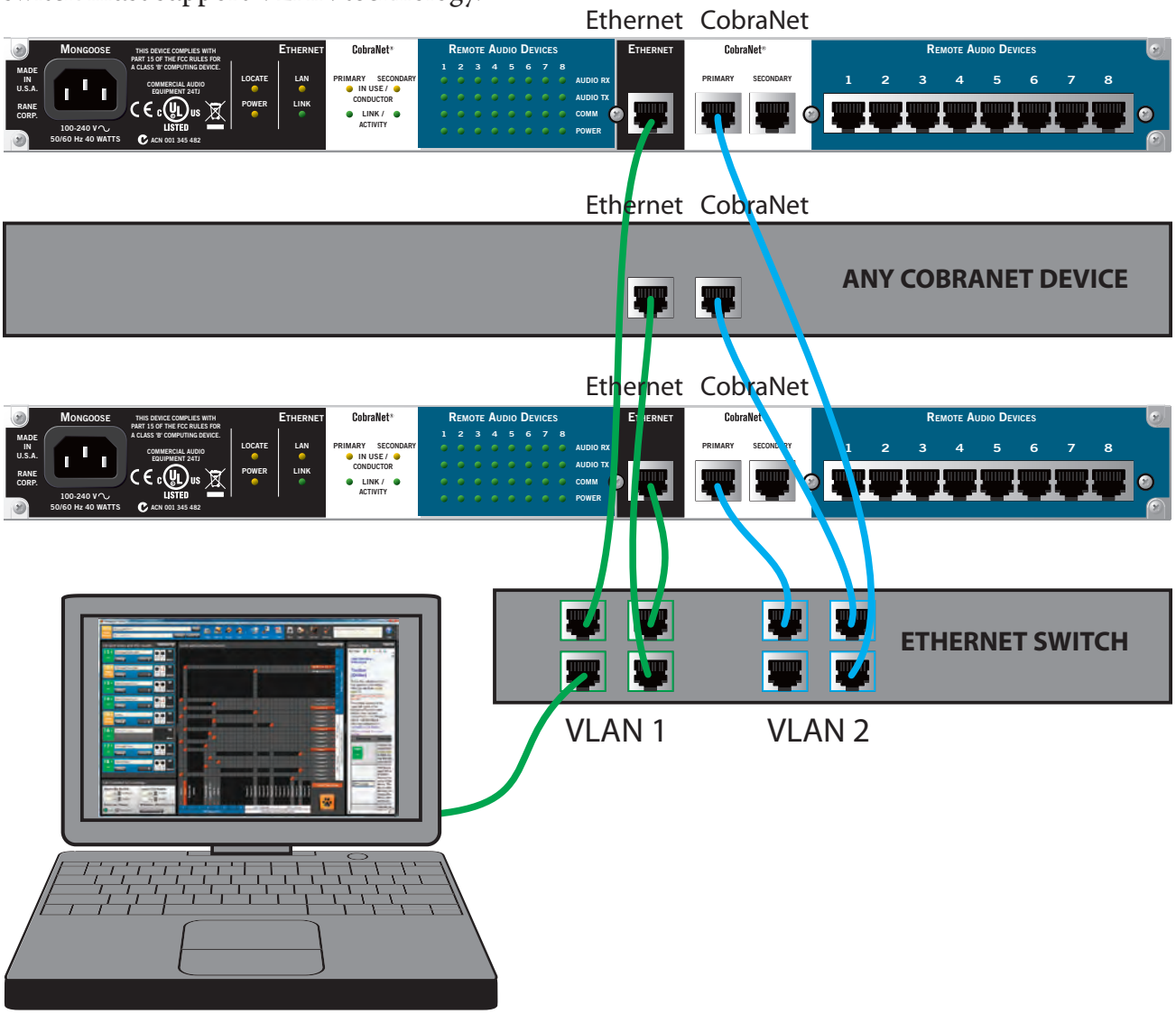


Figure 49: Control and CobraNet Networks - on same switch but isolated via VLAN

SECTION 5: INSTALLING AND USING THE MONGOOSE TRACKER

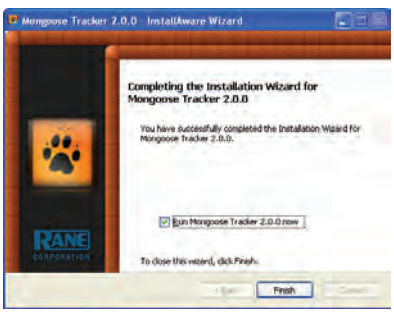
If you've read everything up to this point, you know by now that we highly recommend creating the Mongoose configuration file during the design phase. You'll need the Mongoose software for this task, but you do not need any of the hardware. This section explains how to obtain, install, and start the software. It also provides an overview of what's involved in the creation of a configuration file. It does not, however, include the detailed procedures for working with the software or creating the file. For those details, refer to the Mongoose Tracker help system. Rest assured that installing and working with the Mongoose Tracker is simple and straightforward.

Installing Mongoose Tracker

A CD containing the Mongoose Tracker software is included with your Mongoose hardware. If you're like most people, that CD is gone – accidentally tossed in the recycle bin along with the cardboard box. If that's the case, no need to worry. Simply go to the Rane website and download the software, free of charge. **Note: you must be logged in with administrator rights to install this software.**

Installing the software is simple:

1. Insert the CD in your computer (or click the download button on the Mongoose web page).
2. If downloading the software, on the **File Download** box that appears, click **Run**. If you want to save the installation file to your computer, click **Save**.
3. When the download completes (or after inserting the CD), click **Run** to begin the installation. The installation program first verifies the contents of the setup package. This may take a few moments.
4. When the verification completes, the Welcome screen appears. Click **Next**.
5. The License Agreement appears. After reading the agreement, click the box that indicates you accept the terms, and then click **Next**.
6. Select the type of install you want. The options are **Complete**, **Compact**, or **Custom**. Unless you have very limited disk space, the **Complete** option is recommended. Click **Next**.
7. Indicate the location in which Mongoose Tracker should be installed. By default, Mongoose Tracker is installed in `C:\Program Files\Rane Corporation\Mongoose Tracker`. Click **Next**.
8. Click **Next** again to begin the installation and configuration of Mongoose Tracker.
9. If any additional components need to be installed (for example, the Microsoft .NET framework) or if a previous version of Mongoose Tracker needs to be uninstalled, the installation application displays this information. Click **Next** to continue with the installation. The installation application uninstalls the previous version of Mongoose Tracker (if necessary), installs any needed components, and then installs the Mongoose Tracker application. This process may take several minutes.
10. When the installation is complete, the following dialog box appears: Click **Finish** to complete the installation and open Mongoose Tracker.

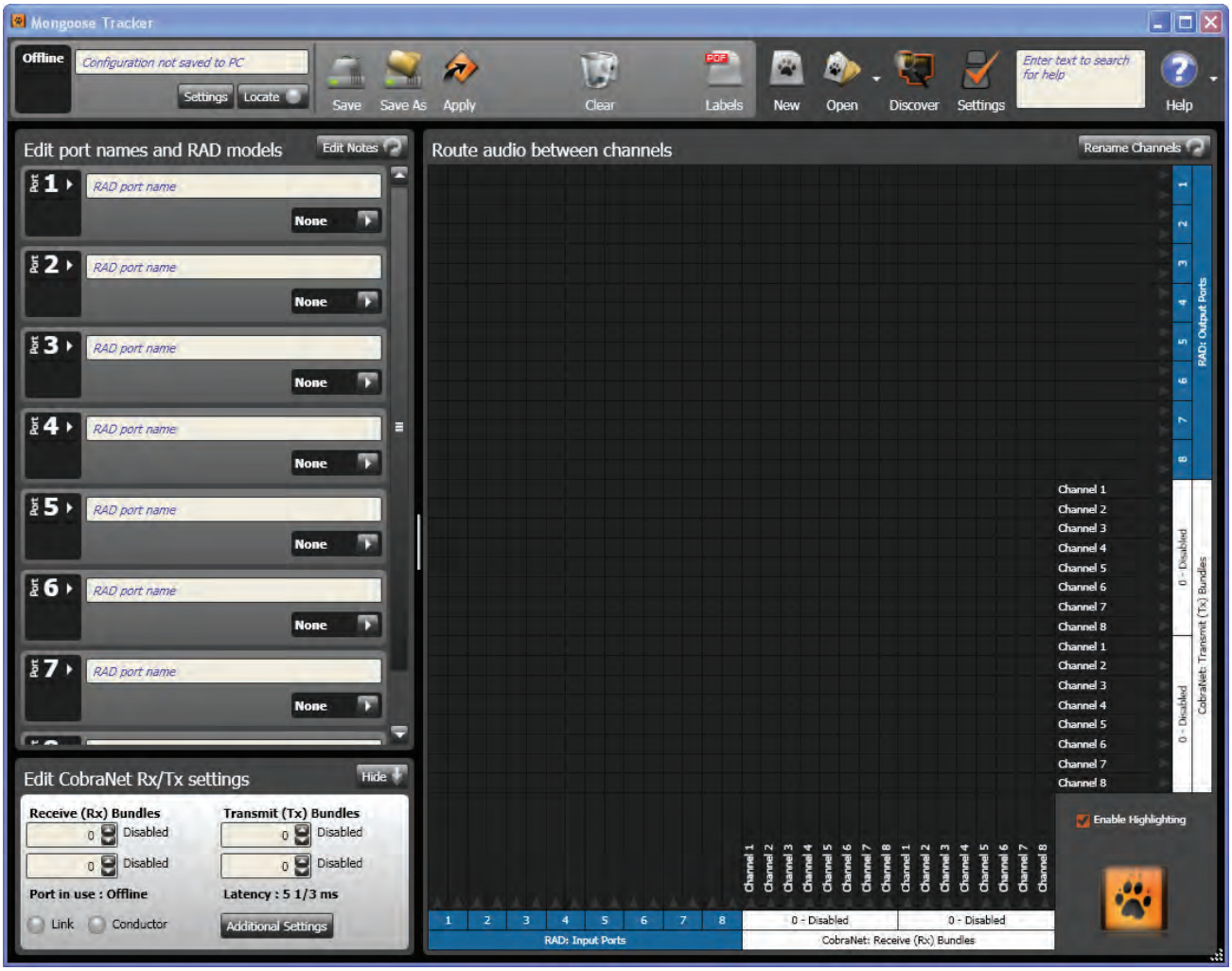

Mongoose Tracker 2.0.0 - InstallAware Wizard
Completing the Installation Wizard for Mongoose Tracker 2.0.0
You have successfully completed the Installation Wizard for Mongoose Tracker 2.0.0.
Run Mongoose Tracker 2.0.0 now
To close this wizard, click Finish.
RANE
Finish

Starting Mongoose Tracker

1. On the **Start** menu, point to **All Programs > Rane Corporation > Mongoose Tracker**.

2. From the choices that display, select the Mongoose Tracker application:

A splash screen displays until the application loading completes, at which point you see the main Mongoose Tracker window:



Working with Configuration Files

For the Mongoose system to function properly, you must configure both the Mongoose and the RADs. You configure such things as the audio routing, specific details for each connected RAD, and settings for the Mongoose and the CobraNet network. The configuration settings are described in detail in the Mongoose Tracker help system.

There are two ways to configure the Mongoose and RAD devices:

1. *Create a configuration file and then apply it to the appropriate device.* This is the recommended approach, especially when initially designing and installing a system. You can create this configuration file without having the hardware on hand, which makes this approach convenient for the designer. When you apply the file to the Mongoose, its settings are actually saved to the device. The saved configuration file then serves as a backup in case you want to restore the device to a known configuration at a later time. You can also apply this file to additional Mongoose devices that will be using the same or a similar configuration.

2. *Configure the device directly.* Using the Mongoose software, you can view and directly edit the current configuration of a live Mongoose. **Any changes you make to a live device's configuration are immediately saved to the device (but not to a file). The changes take effect immediately.** Because you could inadvertently make changes you did not intend, it is always a good idea to have a backup configuration file containing the desired settings for the device. This is why we recommend that you always start with and keep a backup copy of a configuration file.

Configuration Issues to Note

There are a few specific configuration issues we want to bring to your attention. Keep these in mind when creating your configuration file and when providing installation instructions to your installer.

- If any of your Mongoose devices require static IP addresses, you or your installer must enter these addresses directly into the device, as you cannot save these addresses in a configuration file.
- The name for each Mongoose within a network should be unique. Therefore, just as with static IP addresses, the device name must be entered directly into the device.
- If you plan to use an SNMP MIB browser to manage your CobraNet network, you need to provide a CobraNet IP address for the Mongoose. You must enter this information directly into the device. Remember that you can manage basic CobraNet settings from the Mongoose control network. You'll need to use a MIB browser (or the CobraNet Disco software) only if you want to monitor additional CobraNet settings. See the Mongoose Tracker help system for more details.
- CobraNet Bundle numbers are saved to the configuration file. If you use the same configuration on multiple Mongoose devices within the same network, adjust the Bundle numbers as your design dictates.

Distinguishing Between Live Device Settings Versus Configuration File Settings

When you first open Mongoose Tracker, it displays an empty configuration screen. At this point, you can create a configuration, view or edit the contents of an existing configuration file, or – if the hardware is available and connected – view or alter the configuration of a specific live Mongoose. It is important to always be aware of whether you are working with a configuration file or with a live device. This is especially important since any configuration changes you make to a live device are automatically saved to the device (but not to a file).

The software provides an obvious indicator as to where you are at any given time. If you are working with a live device, the configuration screen displays *Online* in the upper left corner. Note that the background in the main window is blue. If you are working with a configuration file, the screen displays *Offline* in a gray box in the same location, and the background in the main window is gray.

To access a live device, you open the software's Device Discovery dialog box. The software automatically discovers and displays all the Mongoose devices it detects on the network. You select the one you want to view. Note the Mongoose device discovery functionality is dynamic. In other words, if a device is added or removed from the system while you are viewing the Device Discovery dialog box, the list of devices changes automatically and immediately. For more details, see the Mongoose Tracker help system.

Note: When working with live devices, you may occasionally want to verify which Mongoose you are actually viewing (if there are multiple devices in your system). Use the Locate functionality for this purpose. This functionality is explained in detail in the *Mongoose Installation Manual* and in the online help system.

Using the Configuration File during Installation

We strongly recommend creating an initial configuration file during the design phase. During installation, your installer can then use Mongoose Tracker to load the contents of this configuration file into the appropriate device(s). The Mongoose automatically detects the RAD models that are connected on each of its ports and reports an error if any of the currently connected RAD models do not match what is specified in the configuration file. This helps the installer ensure that the RADs were installed and connected properly.

Provide your installer with any settings that must be configured directly in the device (for example, the device name, static IP addresses and CobraNet IP address if needed). We recommend that you include this information in the *Notes* field of your configuration file. Look for this button in the user interface:

For more details on accessing configuration notes, see the Mongoose Tracker help system.

If the audio system you are designing is going to be duplicated in multiple locations (for example, for a retail or hotel chain), you can save a lot of time by using the same configuration file(s) in all the locations. The file was designed to be portable for this very situation. It's also possible, however, to use the same

configuration file within a single installation, but your installer may need to modify the audio routing matrix on each device. Make sure you provide this information to your installer.

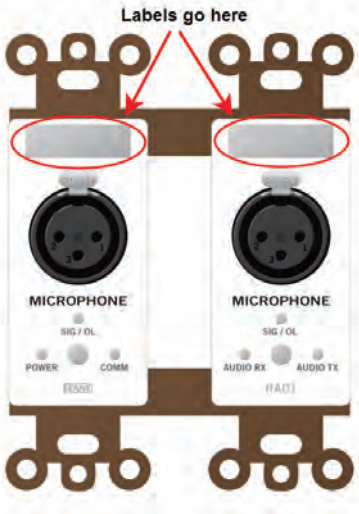
Creating the Configuration File

The software help system provides the details on how to actually create the Mongoose configuration file. Here we will merely provide a few design tips and point out some key things to remember when working with configuration files.

- Complete your design layouts before creating the Mongoose configuration file. In fact, creating this file should be one of the last things you do. If, however, you make changes to your design after creating the configuration file, it is very easy to change the file.
- Provide meaningful names for your RADs and RAD channels. This makes it much easier for your installer to troubleshoot problems. The software provides a helpful *Locate* feature for verifying the location of the RAD you're viewing, but meaningful names make the process that much easier. Note that the software contains a useful naming panel, which serves as a central location for naming all the RAD and CobraNet channels.
- You can open only one configuration file at a time within a single instance of the software. If you want to compare or work with two configuration files at once, just open two instances of the software, one for each file you want to open.
- To provide the configuration file to your installer, you can copy it to any removable media (CD, flash drive, etc.) or send it via email.

Generating RAD Labels

Each RAD contains an area near the top in which you can insert a custom label. We recommend you use these labels to identify the channel associated with the corresponding jack. The following graphic illustrates the placement of the labels:



To eliminate confusion and also streamline audio routing and troubleshooting, the channel names on the physical RADs should match the channel names in the Mongoose Tracker. To help ensure this consistency, the Mongoose Tracker includes a label generation feature that produces a PDF of labels based on the channel names you've entered in the software. We highly recommend this feature to create your labels. The timing of this label creation is up to you. It may be helpful to create the labels at the same time you

create the configuration file and attach them to the physical RADs (if they are available). If you label the RADs early in the process, it may help the installers confirm they are installing the right RADs in the right places.

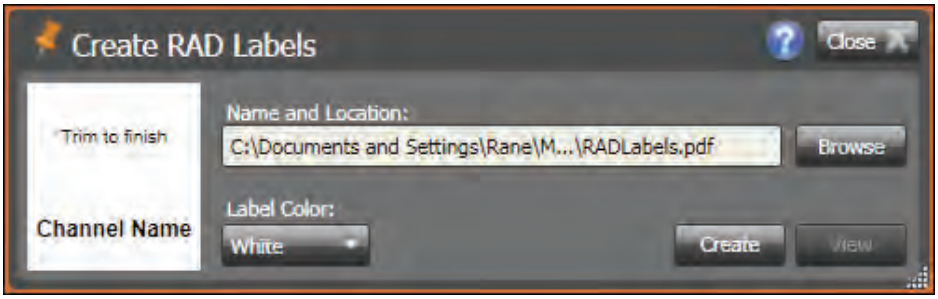
Note: If you do not need custom labels, you can use the generic labels shipped with the RADs.

To generate RAD labels:

1. Within the Mongoose Tracker, open the configuration file from which you want to generate labels. Alternatively, if you have applied the configuration to a device, you can open the device itself.
2. Confirm that the RADs are configured appropriately. At a minimum, enter the names for the channels as this is needed for the generation of labels. To enter channel names in bulk, click the **Rename Channels** button in the audio routing matrix area:

In the window that appears, type the RAD and CobraNet channel names that you want.
3. In the toolbar, select the **Labels** icon:

The Create RAD Labels dialog box displays:



4. In **Name and Location**, browse for or type the location and file name you want for the PDF file you are generating. If you type the name of a folder that does not exist, the software will create it for you. By default, the file is named `RADLabels.pdf` and is placed in `My Documents\Mongoose Tracker\RAD Labels`.
5. In **Label Color**, select the color you want your labels to be (to match the Decora plates you will be using). The choices are white (with black text), black (with white text), and ivory (with black text).
6. Click **Create**. Mongoose Tracker generates the PDF file and, once it is complete, displays a confirmation message and enables the **View** button.
7. Click **View** to open the file.
8. When you are satisfied with the results, print the PDF file. The best fit is with paper of no more than 24 lb weight (90g/m^2) or caliper thickness no more than 5 mils (0.127 mm)
9. Cut out the labels and insert them behind the Lexan window on the appropriate RADs. To help with the alignment of the labels, we recommend that you wait until after inserting the labels before trimming off the excess paper (using an Exacto or box knife).

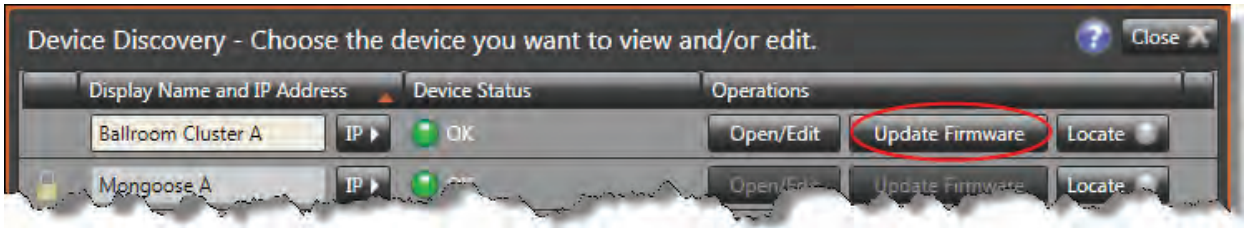
Note: If you want to use different fonts or colors for the label text, you will need to create the label document yourself. To do so, download the Microsoft Word template from the Mongoose page on the Rane website. Enter the channel names, apply the appropriate fonts and/or colors, print the document, and cut and insert the labels.

Updating (or Rolling Back) the Mongoose Firmware

The Mongoose and the RADs contain firmware that controls the functionality of the hardware and allows communication between the hardware and the Mongoose Tracker. It is important to verify that the firmware version on your hardware is compatible with the version of Mongoose Tracker that you are using. If they are not compatible, the system will not work.

To determine if you need to update the Mongoose firmware:

1. Open the **Device Discovery** dialog box by clicking the **Discover** icon in the toolbar. If a Mongoose in the list contains firmware that is older than (or current and compatible with) the version of Mongoose Tracker running, the button in the **Operations** column changes to **Update Firmware**. If a Mongoose contains firmware that is newer than the version of Mongoose Tracker running, the button in the **Operations** column changes to **Roll Back Firmware**.



2. Click this button to perform the update. As part of the firmware update, Mongoose also updates the firmware on the attached RADs (if necessary). During a RAD firmware update, its four status indicators display a racing pattern of green lights.

   Your audio system will be down temporarily while the update occurs, so you should keep this in mind when choosing the timeframe for performing the update. The process is quick - no more than a few minutes. When the update completes, you may be prompted to power cycle the Mongoose.

   Note: The **Update Firmware** button is enabled even if the firmware and software versions are current and compatible. This makes it possible for you to reapply the firmware, if necessary.

CAUTION:

- Avoid disrupting power to the Mongoose device during the firmware update process. In some instances the firmware update process will modify critical sections of the firmware. Disruption of power during this critical update could potentially render the unit unusable and can only be fixed by returning the unit to the Rane Factory. You will be notified via dialog before a critical update, so be certain you have uninterrupted power before proceeding with the firmware update.

- Although Mongoose Tracker provides the ability to roll back the firmware to a previous version, this practice is highly discouraged. Not only will you lose the configuration data on the Mongoose, some of your RAD models may not be supported by the previous firmware version and would need to be removed from the system. For this reason, we strongly recommend that you update your software instead of rolling back your firmware. If you decide to roll back, you should make a backup file of your Mongoose configuration before proceeding - just in case you need it later.

To determine if you need to update your Mongoose Tracker software, do one of the following:

- By default, when Mongoose Tracker starts, it checks for the availability of updates to the software (if an Internet connection is present). If an update is available, Mongoose Tracker displays a link you can use to launch the update. You can disable this functionality (checking for updates on startup) within the **Application Settings** dialog box.

- You can request an immediate update check at any time by selecting Check for Updates on the Help menu.

- Open the Device Discovery dialog box by clicking the Discover icon in the toolbar. If a Mongoose in the list contains firmware that is newer than the version of Mongoose Tracker you are running, the Device Status column for that Mongoose contains a link that says Requires newer software. Click this link to download the latest version of the software.

Uninstalling Mongoose Tracker

You can either use standard Windows application removal procedures for uninstalling the Mongoose Tracker or you can run the Mongoose installation application and choose the **Uninstall** option (on the Welcome screen).

Note that when you initially installed Mongoose Tracker, the following components were also installed (if they were not already present on the computer):

- Bonjour – installed with previous versions of Mongoose Tracker for Zero Configuration Networking (in other words, for discovery of Mongoose devices on the network). Mongoose Tracker no longer installs Bonjour, but it may be present if you installed earlier versions of Mongoose Tracker.

- Microsoft .NET Framework 3.5 with Service Pack 1 - needed for running the Mongoose Tracker

When you uninstall the Mongoose Tracker, you may also want to uninstall these other two components. Other applications may need these components, however. If you are uncertain, we recommend that you leave them in place.

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